FOOD INDUSTRIES

● FOR THOSE WHO CONTROL QUALITY THROUGH MANAGEMENT AND PRODUCTION

ontinuous Forming of
ard Candy Pieces

OCTOBER 1944

How Aussies Do Business Under A Labor Government

Incentive Pay Boosts Production

Inspiring Failures

Culture Flask Aids In Bacteria Count

Industrial Potential Of Hydrolyzed Pectin

Preventing Browning Of Frozen Apples

Spray Drying Eggs For Lend-Lease

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THE COVER

Life Savers are formed continuously with the equipment shown on the cover. After cooking and kneading, the candy is rolled into a "rope" on tapered cylinders. The "rope" feeds into a machine with dies and plungers which form the circular pieces, punch the holes and press on the trade-name. The operation is at Life Savers Corp., Port Chester, N. Y.

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bring copra and sesame seed to crushers . . . to expellers

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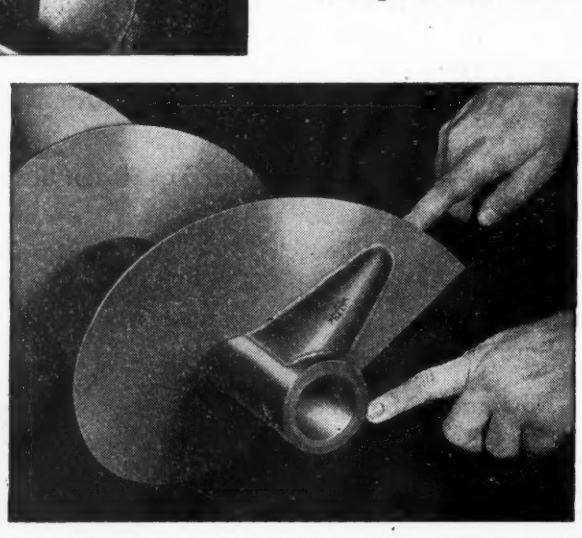

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The Economic Reconstruction of Europe

THE time is fast approaching when allied and enemy populations alike will demand a blueprint for the economic reconstruction of Europe. The peace plans following this World War will be written piecemeal, and by experts, at a series of continuing conferences, such as Hot Springs, Bretton Woods, Dumbarton Oaks and Quebec, each tracing a new pattern for negotiation and each dealing with a single, specific problem. In the drawing of these plans, the United States, as owner of more than half of the world's industrial capacity, controller of the only great credit reservoir, and possessor of the largest force of highly skilled technicians and management engineers, has heavy responsibilities which its industrial, financial, agricultural and labor leaders cannot evade.

☆ ☆ ☆

Just what is the problem which the world's business leaders must help solve in Europe?

The best safeguard of peace is economic opportunity — a good chance for all peoples to raise their standard of living by their own ingenuity, foresight and industry.

Frustrated and disappointed peoples, who view the future with misgiving rather than hope, breed fanatical demagogues who seek to divert nations from their ills and disappointments by promising military glory and conquests.

Consequently, an important step in building a secure and lasting peace is to open the doors of opportunity to the peoples of Europe.

The greatest obstacle to opportunity in Europe has been economic nationalism.

The economic tradition of the Continent always has been highly nationalistic. The national feeling generated by the first World War, and the political autonomy conferred upon many peoples by the peace treaties, led to a great growth of economic restrictions. This trend was accentuated by the depression and by the military plans of the Fascists and Nazis. Hitler had to show his people they could be fed even if a blockade was imposed again. The inevitable result of these influences was to carry self-sufficiency to tragic extremes.

Economic nationalism holds down the standard of living of Europe in two ways:

1. It prevents the rise in most European countries of low-cost mass production.
2. It operates against an efficient geographical division of labor, preventing nations from doing what each can do best.

Great machines require great markets. One great machine of which the United States has many and Europe few is the continuous strip steel mill. At the outbreak of the war we had twenty-eight such mills of various sizes, England but one, and Continental Europe one. A building containing one of these machines is more than a quarter of a mile long and the minimum cost of the mill is almost $25,000,000. Only the prospect of a mass market justifies production on this vast, but highly economic basis.

The wasteful geographical distribution of production is shown by the agricultural policies of Italy, France and Germany.

In the 1930's, when lard sold for less than 8¢ a lb. in the United States, it cost 32¢ a lb. in Germany. In Italy and Germany imports of wheat were banned and its production at home was heavily subsidized. By the middle of the 1930's, wheat sold for $1.55 a bushel in France, $1.97 in Czechoslovakia, $2.29 in Germany, and $2.47 in Italy. At the same time the United States and the other efficient world producers and exporters (Canada, Australia and Argentina) were *restricting* production and were unable to average more than about 75¢ a bushel for their wheat.

Economic unity in Europe must ultimately mean a freedom to trade not greatly different from what we have within the United States. Given economic unity and the large markets which go with it, efficient mass production will develop. With Europe receiving cheap supplies of such staple foods as wheat, pork, lard and dried fruits from overseas, European farmers can prosper by specializing in producing fresh foods—butter, cheese, eggs, fruits, vegetables.

Then European agriculture will be more prosperous producing its specialties, and our agriculture (and that of the other great efficient surplus-producing countries as well) will have greatly expanded markets for our staples.

With a cheaper food supply for Europe—yet one yielding a better price for our agriculture—European labor will live better. Labor now used uneconomically for agricultural production will be released for industry. With big machines and semi-automatic processes European labor can produce more steel, automobiles, furnaces, plumbing and electrical appliances to advance its standard of living in coming decades, as the United States has done in past decades.

A rising standard of living in Europe will bring

Europeans to view peace with optimism and hope. And world trade grows as confidence and prosperity widen.

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How would a Europe which possesses economic unity appear to us on this side of the Atlantic?

It would be a prosperous Europe that would have strength in its advancing industries, but as the single great agricultural deficit area of the world, it would be dependent upon overseas supplies for vital agricultural staples. This dependence upon overseas agricultural supplies would be greatest for industrial Germany. Some people believe that a strong Europe would be a threat to world peace. More important, however, is the fact that a strong and prosperous Europe would not be a frustrated Europe. It would have found a way to achieve a rising standard of living. Furthermore, a prosperous Europe would, economically, be a dependent Europe because, although the European industrial worker would use more and cheaper food, he would have it only as long as he maintained the peace.

A prosperous Europe would be of special advantage to American agriculture (if we do not keep on pricing ourselves out of the market) and of great advantage to American industry.

The British policy of buying agricultural staples from abroad, for example, made her, a nation of only 45,000,000, the purchaser, in 1937, of $250,000,000 of all kinds of agricultural products from the United States. In the same year the rest of Europe (exclusive of Russia), with a population of 325,000,000 purchased only $300,000,000 of our agricultural products. But with more sensible organization of its agriculture, Europe could be expected to buy more than one billion dollars of agricultural products from us.

By far the greatest market for an expanded European industry will be Europe itself.

For American industry, there will be growing markets in Europe as industry expands. Experience shows that the trade between different highly industrialized areas is large. This country's biggest export markets have been with its keenest competitors—Britain, Canada, Japan, France and Germany.

Before the war, Europe, with two and one-half times the population of the United States, had only one-sixth as many automobiles.

If Europe (exclusive of Britain and Russia) were to motorize proportionately, it would need 75,000,000 automobiles. With normal depreciation this would ultimately mean 10,000,000 cars to be produced annually to replace worn out cars.

If one still wonders about the immense number of things Europe might produce *for herself*, let him calculate the highway expenditures, the filling and repair station businesses that must be equipped and maintained; and the doubling of the steel production that would be required to make the automobiles themselves and to reinforce with steel even a moderate amount of additional concrete highways.

Another example is the electrification of Europe. With two and one-half times our population Europe's consumption of electrical energy would be 175 million electrical H.P., if the European worker were to have the advantage of as many H.P. as the American. Yet, just prior to the war, Europe's installed operating capacity was only about 40 per cent of this figure.

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What has been sketched for Europe is actually much more nearly a page from the economic history of the United States than it is mere prophecy about a desirable future for a Europe at peace. But how can it be achieved? And what is our part to be in helping to bring it about?

Economic unity can be provided for the sovereign states of Western Europe by the peace treaty or treaties adopted at the end of the war. The provisions for securing *economic unity* in Europe should specifically cover:

1. Substantial freedom for persons and enterprises to do business anywhere in Europe.
2. Reasonably free movement throughout Europe of persons for employment, recreation and education.
3. Greatly increased freedom of trade:
   a. Within Europe—through the application of a Europe-wide agreement reducing the tariffs among all European countries to a maximum of 10 or 15 per cent.
   b. With the rest of the world—through reduction of European tariffs on goods bought from overseas. This would call for generally lower levels on manufactured goods, and for the removal (after a reasonable period of progressive reduction) of tariffs on all agricultural foodstuffs and most industrial raw materials.
4. A special currency provision requiring as nearly as practicable complete currency stabilization for all countries of Western Europe among each other.
5. Creation of an agency (with adequate revenues) through which all Europe-wide business and other affairs affected by these agreements would be administered for a minimum period of twenty-five years.

This would permit the economic unity of Europe to be substantially achieved. During this period, assistance in administering the provisions would be given by officials of the United Nations.

Near the end of such a period arrangements could be made for a vote in the European countries on whether or not to continue the "unification provisions." If the vote were in the negative, the United Nations would have proper warning that additional safeguards would be necessary to prevent war.

The suggestions made in this statement aim at securing economic unification of Europe and thereby promoting the possibilities of permanent peace in Europe.

The realization of these possibilities throughout the postwar years requires a freely expressed public opinion in Europe to guide all who share the responsibility for bringing peace to Europe and to the world.

James H. McGraw, Jr.

President McGraw-Hill Publishing Company, Inc.

Postwar Preparations—XI

Management Thinking

EVENTS in Europe have been moving rapidly. Even the most conservative minds realize that the time for resuming many peacetime activities is nearly here. Hostilities in Europe cannot last a great many months longer. Military food demand will, however, continue for some time for, until all our soldiers are back from Europe, they will have to be fed, and it is unlikely that they can obtain much subsistence from European resources. Demand for food for relief will still continue unless all previous intelligence from Europe has been hopelessly inaccurate. Yet, in spite of all reasons for a continuation of government purchases of food, it should be apparent to anyone with half-an-eye that the end of military European wartime food demand cannot be very far away.

To be sure, the war with Japan will continue for some time—perhaps for two years, but our forces in SOPAC and SWPA are being fed by New Zealand and Australia under Reverse Lend-Lease, supplemented, of course, by some shipments from the United States. This may, however, change at any time. But more important is the prospect of diminished consumer buying power in the Eastern parts of the United States. Reconversion of nonfood industries from war to peace will require shut-downs and may have the effect of curtailing civilian buying power until these transformed industries shall be again in production. Let us consider future management policy for meeting these changes, as well as the long time changes.

A New Basic Philosophy Needed

If nearly four decades of intimate association with the food processing industry entitles one to an opinion, then I believe that too much stress has been placed in the past on the problems of peacetime *selling* and not enough on the problems of peacetime *production.*

Those executives who have often reiterated that there are no problems of production, that the only problems that exist in peacetime are selling problems, are generally men who do not understand production or its economic relation to selling.

Those who are credited with being the smartest merchandisers are generally men who are the ablest manufacturers—or have in their employ men who are top-notch production men. This is not to deny that many a man who is ignorant of production may be able to outsmart his production-minded competitor. But it does affirm that many a man who is fighting a competitive battle with only the aid of selling technics and buyers' chiseling is forgetting to punch with his left.

Most good merchandisers in the food processing industries are really great manufacturers. It takes unusually able sales departments to sell high-cost goods at a profit. It does not require the same selling ability to sell quality goods at a profit if they are produced at costs below the average of the competition.

The firm that has the lowest costs of production, yet has the excellence of quality equivalent to its higher cost competition, will usually acquire a reputation of being the smarter merchandiser.

Why some manufacturers gladly pay very princely salaries to sales executives and neglect the very men who make possible their sales successes has always been a bit of a mystery. It is explainable only on the assumption that a good salesman can usually talk louder and faster than a good production man.

The first step in postwar preparation should be a decision by the head of the company as to what basic course he intends to follow. (1) Is he going to pursue policies of the prewar period or (2) is he going to accept the fact that we have been going through the greatest upheaval in all history and that, as a consequence, many other manufacturers are preparing changes and improvements which may be so successful that he will be practically out of the running unless he matches their improvements?

If his decision is the first, then the shares of his company are likely to be an excellent short sale.

If his decision is the second, then he is going in for postwar preparations of far-reaching effect.

In general, the best postwar preparations will be in the following categories: (1) New products that taste better than the older ones. (2) Lower costs of production which will necessitate departure from traditional ways of manufacturing and will require an independence of thought and action heretofore unknown—less dependence on standardized equipment and processes and greater reliance on innovations *after pilot plant tests have proved them to be sound.* (3) Lower costs of distribution—the physical acts of distribution—not the selling technics that are so often erroneously called distribution.

Let the policy of management be an effort to achieve a balanced program where each activity of the company carries its full load and is adequately rewarded. Such a policy is a sound one at any time in any company's history. But it is doubly sound for the immediate future when surprises aplenty will be sprung by the competition.

L. V. Burton EDITOR

The Talk of the Industry

• A SEPTEMBER 1944 black-out drill in an eastern city recalls a boisterous Colonel in a New Guinea base which then was visited almost nightly by Jap bombers, yet our forces never shut off the lights unless the Jap was really overhead, dropping his eggs. On learning that American cities were lifting the dimout the Colonel exploded,

"You don't mean to say that cities back home have been dimmed out! Gor Blimey!! It must be wonderful to be where the war is so serious!!!"

• THOSE whose duty it is to worry about the future of business have taken heart from the postwar tax plan proposed by the Committee for Economic Development. Comes like a fresh breeze of economic sanity the first principle that "the tax system must impose the least possible restriction upon the expansion of production and employment." When better tax plans are made, we hope Studebaker's President Hoffman will help make them.

• PLANS for a permanent international food organization have been submitted to 44 countries by the United Nations Interim Commission on Food and Agriculture, with the urgent recommendation that the body be established as quickly as possible. Unless the organization is in a position to exert influence in the immediate postwar period, it is felt that the high purposes of the Hot Springs Conference last year will be lost. Right now the world economic situation is fluid, but once nations are freed from the uncertainties of war it will become frozen by the growth of vested interests.

With that one agrees, but one cannot help but wonder if the cold commercial realities of postwar international trade will not freeze the effectiveness of this organization however quickly it may get into action.—And more's the pity.

• APPROPRIATELY enough, pepper has become a hot subject. Spice grinders face a serious pepper shortage which will reflect itself in headaches for food processors. This shortage is caused by low ceiling prices. The top price permitted by OPA on imported pepper is 6½ cents a pound, and importers don't want to sell under 10 to 10½ cents. WFA tried to force the sale of 4 million pounds but was blocked by a suit instituted by a New York importer. So the supply of this food ingredient must remain uncertain until an overworked U. S. District Court in Washington can dispose of the case.

• WHEN Crosby Gaige told the symposium on quality and flavor at the American Chemical Society that trial and error is the only way to learn about the desirable mutations and permutations of flavors, his remarks deserve widespread dissemination.

Many a person has wondered how on earth one goes about learning the art of flavoring. Mr. Gaige has supplied the answer—trial and error. Of course, this presupposes that the experimenter has great curiosity about flavor combinations, and that he has at hand a great variety of flavoring substances with which to experiment.

We have seen several new products that have practically died aborning simply because they were in the hands of laboratory men who knew little about the fine art of creating good flavors or flavor combinations. Which is not to be implied as adverse to the man in the laboratory but as underscoring the remarks of Mr. Gaige to the effect that chemistry is an analytical art, not a creative art. Good tasting food is an artistic creation having little to do with science. But to maintain the fine flavor that is chosen as the one best suited for the market—ah, that is where science is much needed.

To create the better flavor, there is no better process than trial and error.

Hors d'Oeuvres

• Says the Japanese Tea Drinking Society, "If Hitler will become addicted to the gentle art of tea drinking, his nerves will be quieted." Haven't the Nips heard about his Patton medicine? Before long his nerves are likely to be very quiet.

• *A cannery workers' union on the West Coast has reduced to 50 cents a week the fee which it charges housewives volunteering for victory work in the canneries. Damned considerate of the union to lower its charge on patriotism.*

• "Too Busy to Die" is a second mystery thriller from the pen of H. W. Roden. In addition to being a successful writer, the author is president of American Home Foods, Inc., and Clapp's Baby Foods and chairman of the board of G. Washington Coffee Co. So you can see where he got the title for his new book.

• *In 1917 helium was so rare that it sold for $2,500 a cubic foot. Now Uncle Sam extracts it by the million cubic feet at less than 1 cent a cubic foot. It is so abundant, in fact, that it is even suggested as a food preservative. Beverages "carbonated" with helium ought to have quite a lift.*

• 'Tis reported that tasty horse meat with onions has become a favorite dish at the Harvard Faculty Club, where the professors are consuming 100 lb. of it a week. What if someone yelled "whoa" when a bite was half way down?

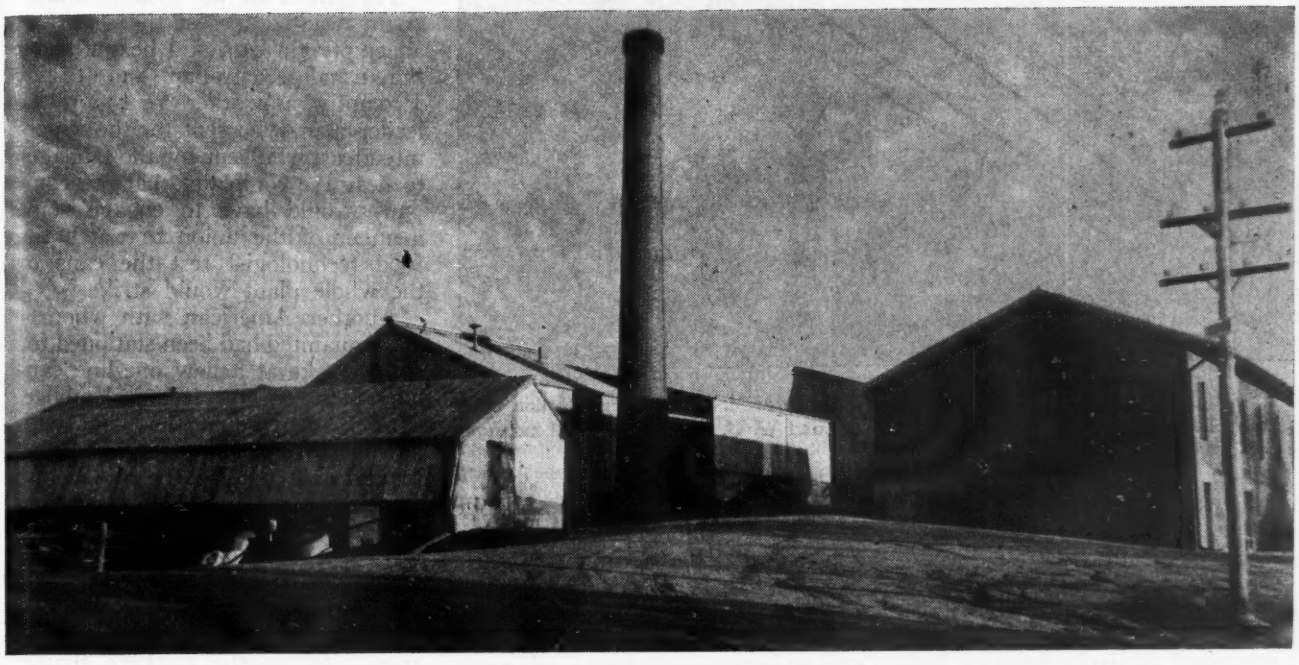
• *If you have a yen to own a little farm far from it all, you will be pleased to know that the Office of Foreign Agricultural Relations has just published a piece about the agricultural potentialities of Manchuria.*

• The now famous "lost battalion" of this war was supplied with certain necessities by shooting them in the shells of our "Long Tom" artillery. Maybe there's a postwar idea here for the food distributor who wants to make a specialty of quick delivery service.

• *Coyotes are a new source of fats and oils. In two months two Yuma County trappers caught 110 of the animals and rendered them for grease to be used in manufacturing munitions. The largest yielded 6 lb. 3 oz. of fat. So if you are searching for a new postwar product, it might be Coyote Cooking Compound.*

• They say that American troops in England are becoming tea conscious. And their forefathers fought a war for the privilege of throwing the stuff into the sea.

F.K.L.



Part of the canning plant of Gordon Edgell & Sons, Bathurst, New South Wales, Australia. This is one of more than a hundred plants visited by the author.

Aussie Industrial Management Under a Labor Government

By L. V. BURTON, Editor of "Food Industries"
(Serving as War Correspondent in the Southwest Pacific Area)

On-the-scene observations of the headaches of industrial management in Australia. We really haven't seen anything in the way of labor trouble, but we may unless management helps labor develop statesmanlike leadership

"IT would drive me nuts to run a factory in Australia," I remarked to a manufacturer after he had shown me his plant and had told me about his troubles with problems of labor management.

"Sometimes it does us, too," was his rejoinder.

"How on earth can you meet their demands and still remain solvent?"

"Well, you see, we have a labor government, and sometimes I think it tempers the wind to the shorn business."

"How?"

"All our business is on government orders, and they seem to allow us selling prices that permit us to exist after all the excessive labor awards are met.

"Will this keep on indefinitely?"

"That would be impossible. We are spending more than we are taking in as a nation. The end must come sometime."

The foregoing conversation is related because it reveals several things, and because I am of the opinion that what Australia is going through at the present time is something that the United States may unhappily some day undergo. Though some Americans here are of the opinion that industrially we have progressed farther than Australia, I am convinced that Australia has gone much further than the United States in social experiments. Ever since the conservative Menzies government was defeated several years ago, the political power in all the states of Australia and the Commonwealth government has been in the hands of organized labor. And, in spite of all the efforts of the more conservative people, the labor group appears to be firmly in the saddle, just as firmly as the New Deal in the United States. No apparent

War Correspondent Burton and Major M. A. Joslyn in Australia. The Major holds a copy of "Yank," the servicemen's paper.

H. J. Williams, manager of Leeton Cooperative Cannery; M. C. Landy, production manager of Shepparton Preserving Co.; T. W. Easton and W. G. Walker, assistant manager of the Kraft-Walker dehydration plant.

trend away from the labor government is discernible in the recent state elections in Australia.

I feel it in my bones that Australia is furnishing us with the pattern of the shape of things to come. There is a marked similarity between their trends and our own. For this reason, it is important to know what is the current situation in Australia so that we may better understand our own affairs. If we are intelligent, we can help to shape future events in a way that will avoid some of the industrial and political troubles the Aussies have been undergoing.

One day, as I was walking through a large food plant with the works manager, a machine operator touched my arm and then said to me:

"I s'y, one of our fellows has gone to your country, but we don't hear much about him any more."

"Do you mean Harry Bridges?"

"Good ol' 'Arry. What has become of him?"

"He has had things pretty well tied up in knots during the past few years. I am sure we would be very glad to return him to you."

"Well, you can always count on 'Arry to be on the right side."

"Come along!" the works manager interrupted, and being a very tractable guest, I obeyed. Later, I inquired why he had stopped what would have been a very interesting bit of chatter. "There is no telling where such a conversation will end. I prefer to avoid trouble."

"Do you mean to say that a debate between me, an outsider, and one of your people would lead to trouble?"

Sagas of Strikes

"Indeed it would. Strikes have been caused by far less than that. We find it most unwise to discuss anything like that with our staff."

That conversation, rather early in my visit to Australia, I thought to be an exceptional case until I began to realize there was a very serious situation here. Then I began to make a collection of stories on the cause of strikes—my definition of a strike being *a stoppage of work without the consent of the employer.* Here are some of the stories:

The temperature of the water in the amenities building of a meat packing plant was 4 deg. F. colder than the specification in the "award," so they struck.

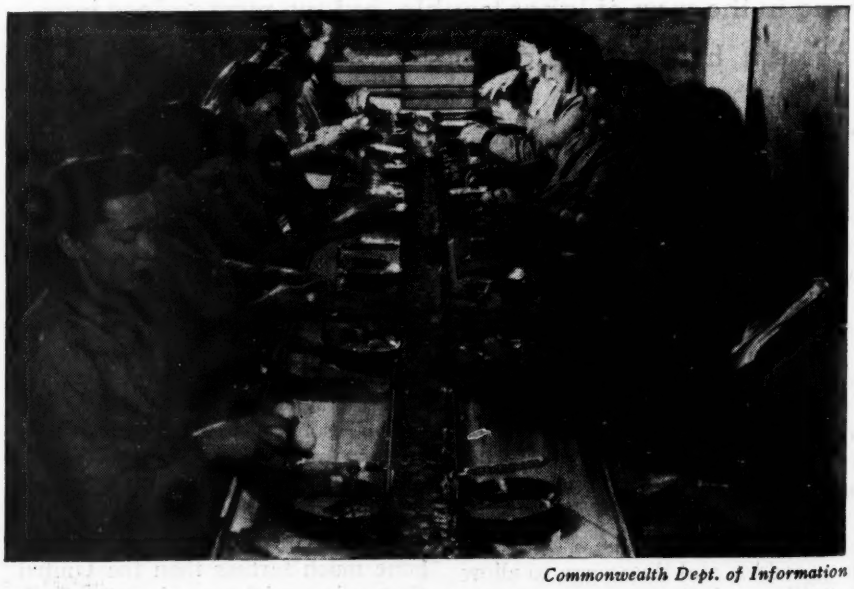
In one of the buildings of a tram line there was an old wooden closet with a nail on the wall where an elderly employee had been accustomed to hang his clothes for a great many years. One day the place had to be rebuilt, but some one forgot to put up a nail for the old man. This led to a strike.

A workman found ants in his lunch box, and the whole plant struck.

An officer of the United States Army wanted to test the seams of an empty tin can, and he put it on the usual Australian can tester. Promptly a worker sent for the leader man, who sent for the superintendent, who sent for the manager to hear the complaint that the company would have to engage some member of the union to watch the food technologist test the cans or the whole plant would strike.

Another American with whom I am acquainted had been stationed for some weeks at a new one-line canning plant to give technical advice. Strikes occurred at the plant with amazing frequency over the most trivial matters. Nearly all of the "quickies" that came off—and they occurred about four times a week—were over matters in which the management was seldom involved except in a most remote manner. Once in the Autumn the weather grew cold, so the workers struck. Another time the water was not hot enough for brewing tea during the morning and afternoon "tea break," so they struck. One day a girl insulted another, and the whole gang walked out.

Actors in the supporting cast in all the theaters in one city struck because the stars would not join their union. The killers in the largest slaughter house went on strike because the wind was cold. They left hundreds of animals in the pens to be killed on a warmer day. In another meat plant, the workers refused to work more than four days a week despite the desperate need for meat to feed the armed forces of both Australia and the United



Commonwealth Dept. of Information

Workers breaking eggs in an Australian food plant. Whites and yolks are mixed by machines, frozen at 0 to —10 deg. F. and held in storage at —10 deg. The egg production goal in Australia is 100,000,000 doz.

States, giving as their reason the fact that income taxes are so high that any money earned after the fourth day of any week must be paid over to the government as income tax. A refusal to work may not be a strike, but the plant is down just the same.

Exaggerated? Well, Now—

Do you think these are exaggerated cases? All right, let me quote you some from the Australian newspapers:

"13 *Mines Idle in N.S.W. Grave Threat on Butter Cut*—A serious hold up of coal mining is threatened on the Northern and Western fields over the proposed reduction of the butter ration. Today—one of the gravest in the industry for some time—13 mines were idle, six of them on the butter issue. This week more than 45,600 tons of coal has been lost, of which 18,500 tons has been over the butter issue in the past three days."—Sydney *Herald,* June 2, 1944.

"Where There's Smoke There's Fire —A few puffs of a cigarette stopped work at a defense establishment in . . . yesterday. After dismissal of one man on a charge of having smoked in a hangar, 60 others, including fitters, welders and tool makers decided to put down tools. Today, officials of the engineering unions ase trying to straighten out the dispute." —Melbourne *Argus,* May 31, 1944.

"Abattoir's Employees Strike, Men Complain of Yard Conditions — Sixty employees of the Richmond City abattoirs went on strike today, complaining of the discomfort and unhygienic conditions allegdly imposed on them by the out-of-date facilities in the yards. The stoppage followed an inspection of the premises by the shop committee of the Meat Employees' Union."—Melbourne *Argus,* May 31, 1944. (From some of the subsequent reports on this dispute, it would appear to have had considerable merit. I base this opinion largely on the evidence of published photographs.)

"Strike Cuts Meat Production — Because of a strike of beef slaughtermen at Homebush abattoirs yesterday, only 322 head of cattle instead of 759 were killed. Four offal hands yesterday morning demanded rubber boots. They stopped work when the demand was refused."—Sydney *Telegraph,* May 20, 1944. (The Homebush abattoirs are owned and operated by the state of New South Wales.)

"Strike at Soldier's Grave — Because a military funeral arrived at a war memorial cemetery at 11.5 A.M. on Saturday—five minutes after their unofficial knock-off time—gravediggers refused to fill the grave. Soldiers from the military bearer party had to fill in the grave of their comrade. The undertaker said today that, although the gravediggers were not entitled under their award to knock off until midday on Saturday, they would not fill the grave of a funeral arriving after 11 A.M. . . . — Dispatch from Melbourne in Sydney *Telegraph,* May 22, 1944.

"City Faces Severe Meat Shortage, Refusal to Employ Thieves Causes Hold-up — Sydney is facing its most serious meat shortage since the war began because loaders at Homebush abattoirs are on strike as a protest against the Meat Commissioner's refusal to employ three men who were convicted last week of having stolen meat from the abattoirs. . . . The loaders stopped work on Sunday night when the three men who had been convicted presented themselves for work but were not taken on. Immediately it was informed of the dispute, the union delegate board met and ordered the men to resume. They refused. In the meantime, some master butchers had taken supplies from the abattoirs in their own vehicles. Late yesterday afternoon, Mr. Justice Cantor convened a compulsory conference, and after union executives had discussed the position with him, his Honor ordered the men to return to work. The loaders met for an hour and a half last night at the abattoirs, but decided not to resume unless the three men were reinstated." — Sydney *Morning Herald,* June 6, 1944.

"Fifteen Collieries Idle in N.S.W. — Fifteen mines were idle on the northern and western New South Wales coal fields, entailing a loss of nearly 14,000 tons. The stoppages were due to a variety of causes, including protests at the cut in the butter ration. . . Five northern mines —Pelaw, Main, Abermain, No. 1 Bloomfield, Stockton Borehole, and Pacific— were on strike because of the cut in the butter ration. Employees at Stanford Main No. 2 stopped work because a pair of boots belonging to a clipper had disappeared from the bath house. Another pair of boots was supplied by the management, but the clipper refused to wear them because they were second hand, and the men went home."—Sydney *Morning Herald,* June 6, 1944.

"Strike on Wharves 'Must End' — More than 2,000 wharf laborers who were on strike in Sydney have been ordered to resume work unconditionally. . . . The dispute which began last Friday concerned whether wharf laborers should load 24 food packages in three tiers or 20 packages in two tiers into an overseas freighter. Yesterday, overseas and interstate ships in Sydney were without labor and more than 2,000 wharf laborers were idle."—Sydney *Telegraph,* June 1, 1944.

(Supplementing the last item, these ships were being loaded with subsistence supplies for the U. S. Army forces actively fighting the Japs. The need was so urgent that quartermaster personnel, both enlisted men and officers, who were normally employed at desk jobs, worked

Above: New amenities buildings at Gordon Edgell & Sons, canners. Amenities buildings are essential to good labor relations in Australia. Below: Dining room in amenities building at Gordon Edgell & Sons. At the counter, hot water for tea is supplied and meat pies are warmed.

Commonwealth Dept. of Information

Workers filling cans with tropical butter fat spread, developed by Australian scientists so that fresh butter could be supplied to Allied troops in tropical operational areas. It will not melt at 105 deg. F.

Sunday and at night to get the ships loaded. The "wharfies" looked on or stayed home. But the union grip is so strong that the strikers were drawing regular pay for the work done by U. S. soldiers, and this includes 2½ times regular pay for the Sunday work

"Ships Needed for Troops Held Up —Defiance by Sydney wharf laborers of an instruction by the federal executive of the union to return to work resulted in a rapid extension of the waterside strike today. Many of the ships now held up are urgently needed for the services. One vessel, carrying a full cargo of potatoes, has been waiting two days, while a second loaded with 50,000 cases of apples is also waiting to be discharged. Only 1,650 men attended the picking-up centers early today, but did not offer themselves for work. The focal point of the dispute, which arose out of the loading methods, has now shifted to the question of whether 200 men originally involved should be stood down for the duration of the job under an order of the Stevedoring Industry Commission." — Sydney *Morning Herald,* June 1, 1944.

All the foregoing instances of labor strife would be very funny, were there no war to be fought and if the future of the United States, as well as that of Australia, were not vitally concerned. From the many incidents, it is at once apparent that Harry Bridges probably has many more tricks up his sleeve in his unionization campaign in California. And, speaking of Mr. Bridges, a manufacturer with a wry grimace once told me, "America will never be able to repay us for what we have given her!" But let us consider what management thinks about the labor movement in Australia.

Can't Control Workers

I have talked these matters over with well-educated, liberal-minded industrialists, who have taken a very broad view indeed. One of them told me that reforms were long overdue, that many of the demands of labor were entirely justified when first made, but that the rank and file of labor has become intoxicated with power and labor leaders have not been sufficiently powerful to control their constituents. This had led to excesses, and any excesses, whether committed by management or by labor, are not good for the country at large.

This same refrain—the inability of leaders to hold their constituents in line or make them adhere to contracts and awards—comes up more frequently than any other. This makes things very bad, for meritorious disputes that are settled have the bad habit of becoming unsettled again, or cast aside for very trivial reasons.

Another serious-minded business man told me that the problem of business in Australia is to be able to continue in operation while organized labor is growing to mental maturity. Labor has become very conscious of its political power. It has achieved full control of the government. But aside from a few leaders, it has not yet developed a sense of responsibility. Many of its actions are those of politically immature minds.

And still another manufacturer viewed the future with grave misgivings. Speaking from first-hand observations, he said that in America labor is equally as powerful as in Australia but does not restrict production like the Aussies do.

"You in America have your problems, and you must pay high wages. High wages are possible in America because you get the production. The only thing that actually limits the wages a firm can pay is the productivity per man. Your labor groups appear to be willing to recognize that principle, but ours do not. If labor in Australia continues to restrict production, they will make it absolutely impossible to meet their wage demands. Only by unrestricted production is it possible for industry to pay increasingly higher wages to our workers."

On another day I was discussing the matter with the managing director of one of the largest concerns in Australia, and was inquiring if he, too, had observed the restrictions on output and the unconsciously self-imposed limitations on possible wage increases. He then related a long line of troubles of this sort, which was very impressive. Concluding, he paraphrased Churchill's famous remark:

"Never have so many done so little for so much."

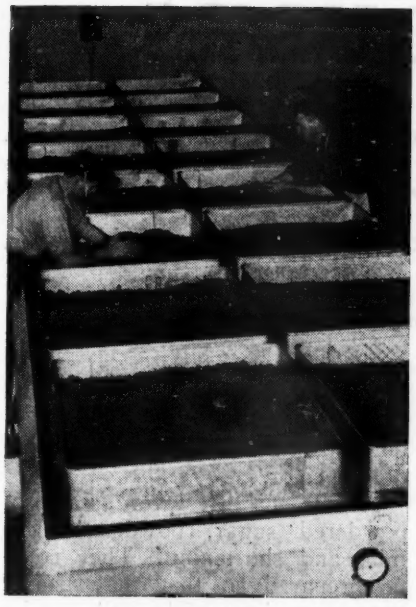
Whenever I have quoted his wisecrack to other Australians, it apparently has been new to them, but they all agree that it is a perfect summation of the labor problem in Australia today.

Basic Strike Causes

If I had a couple of years at my disposal and nothing else to do, I might be able to get to the bottom of all the social-economic problems of Australia. Such a prolonged study obviously is impossible to one who is here for only a short time. One Aussie newspaper man, Robert Nelson of the Sydney *Daily Telegraph,* spent five months in the Newcastle region alone, trying to fathom the reason for over 100 coal miners' strikes in that short period, at a time when Australia is engaged in a war with Japan, a nation which has about ten times as many people as Australia, with the nation's coal supplies down to dangerously low points, with fuel so scarce that a swank hotel like the Menzies in Melbourne cannot be warmed in cold weather, and with everybody in Australia urged to conserve fuel and electricity. The reporter spent five months on one small region of a continent that is as large as the United States and concluded that the coal miners are good citizens but that they need reeducating. His summary of the more important factors influencing their minds is worthy of quoting here:

"Inability to mix with other types of Australian workmen engaged in other industries.

"A high sense of loyalty to fellow coal workers, born in the hours spent underground in darkness and isolation.



Commonwealth Dept. of Information

Australian dehydrated mutton is being shipped to the United Kingdom and to Allied forces in the Southwest Pacific. Here is the first stage of drying. Ground meat is in wire-bottom trays, and hot air is forced up through it from below.

"Traditional suspicion of the coal owners, arising from bitter industrial battles.

"Incapability of discussing any other subject but coal, even after they have come home from work.

"Lack of recreational facilities in most mining towns.

"Poor housing.

"All of these things distort a man's sense of values over the years, draw him closer to his immediate neighbors. At Cessnock, 45 miles west of Newcastle, there are hundreds of people who have never been to Sydney, 150 miles away."

The sort of education that the investigator thinks the miners need is the kind gained from frequent contracts with people from other regions and in other walks of life; in short, travel. But travel is not easy in Australia. Distances are huge and the country cannot afford the very rapid transportation facilities enjoyed in the United States. Roughly half of the people live in the six capitals. In between are a few towns, but the impression I have received on a motor trip from Melbourne to Sydney, and from looking down from airplanes, is one of vast emptiness. The hypothesis keeps developing in my mind that the size of Australia is at the root of the isolated sort of thinking that creates so many of its labor problems.

You at home who have the responsibility of directing manufacturing enterprises think you have your troubles, but in my humble judgment "you ain't seen nuthin'" yet. Whether America will follow the pattern of strife that now appears in Australia will depend on how genuine and how effective will be the continuation of our various industrial-relation policies. I am convinced that America has made very gratifying progress toward mutual understanding.

In Australia, all wages and conditions of employment are fixed by the government through a system of awards. Labor has little more to gain there, for labor controls the whole government. A spokesman for organized labor in Australia once said, "We have no labor troubles. We have only management troubles." The implication of his remark is that management has not yet learned its part of the joint responsibility of operating factories.

An American who manages a food plant in Australia says that he has had no labor troubles worthy of mention, but that this condition is gained only by strict observation of the letter of every award and by giving in to every demand of organized labor.

There is, however, another feature of life here which may possibly have a bearing on the problems of Aussie industrial relations. There is a curious custom of knocking discreetly on every door before opening it. And every door is always closed. The door leading to an office that stands open is a rarity. Many times I wonder if this is not symbolic of the gap between management and its employees. In my walks through about a hundred plants in Australia, I have never heard a cheery greeting to the various workers when my escort has passed them or paused to look more closely at some operation. Never a word is spoken, either by the worker or the superior, save in the one case where a chap wanted to know from me what had become of Harry Bridges.

Whether the seeming sullen silence is a cause or an effect I cannot state. But I am convinced that it is not a desirable condition and that if it is ever to be changed the initiative must come from management. Industrial relations in America are far from perfect, but we have made noticeable progress toward a friendly spirit between those who labor and those who direct their efforts. It has taken a visit to Australia to show me that our efforts in this direction are beginning to bear fruit.

If America is to avoid the sort of strife that has characterized Australian industry during the past few years, management must do its utmost to help labor to develop statesmanlike leadership. The ranks of labor are so voluminous that they can have complete political power should they decide to utilize it. Unless the labor leaders are sufficiently wise and powerful enough to control the irresponsible ones of the various organizations, we unhappily may see a repetition of the absurd and trifling sort of disputes that afflict our ally.

EDITOR'S NOTE—*Though Larry Burton is now back in this country, this article was written in Australia and mailed to the United States. It is his third first-hand-report.*

Commonwealth Dept. of Information

Removing sliced carrots from a steam blancher in a dehydration plant.

INSPIRING FAILURES

A few pages from the notebook of a food technologist describing good ideas which just missed being good enough—near misses with a lot of interesting technology wrapped up in them. It's quite as important to know what won't work as what will

By W. R. VAN METER, Kingston Cake Co., Kingston, Pa.

WE are told that nothing succeeds like success, and success forms the basis of almost the whole of our literature of technology. But what about the experiments that ended in failure—isn't there anything of interest to them? What about that file existing in most research or development laboratories—the file marked "Results Inconclusive" or "Blind Alley" or even "The Graveyard."

They tell a story about one of the big soap and shortening manufacturers. It seems that every young chemist of promise coming to the firm is soon afterwards given the problem of concocting the ideal shaving cream, the shaving cream so perfect that it will make even the claims of an advertising writer a chronicle of sober truth. So far, I believe, the company has never marketed a shaving cream, though over the years a goodly crop of chemists has taken a fling at the problem. There's one company whose failure file would make interesting reading.

In the belief that experiments which never quite come off—the moronic brain children, so to speak, who lived and died unsung in the back pages of a busy food technologist's note book—deserve some attention, the following is written. I am recalling a few good ideas which just missed being good enough. Mainly they concern some phase or other of the production of bakery products.

Pie-crust Pioneering

One series of experiments was initiated with the idea of finding some other means than the customary one of spraying an egg-milk wash on pies to produce an appetizing, golden-brown pie crust.

Pie washes are usually mixtures of egg and milk, and in large-scale operations are commonly applied with a spray gun. The disadvantages of any spray method are: (1) the mess involved, (2) the difficulty of confining the spray to the object to be covered, (3) the need for making provision for carrying off spray vapors and (4) the recurring nuisance of clogged spray nozzles.

It was thought highly desirable to find a new way of putting the golden brown color on pie crust. A dry powder mixture was sifted on, and the pies appeared to have the measles.

Consequently, it was thought highly desirable to find some other means of putting the color on the crust.

I do not know just how it is with most laboratories, but it seemed with us that things were likely to run in cycles. There would be a time, for example, when everyone in the Lab would want to try the same solution on every new problem. Perhaps it would be a particular solvent that had worked with spectacular success in a given instance, or an emulsifying agent, or even, when they first appeared in commercial quantities, such products as lecithin or soya flour.

When the pie crust color problem came up, the Lab was in the midst of a "dry powder" cycle. A dry powder mixture was the cure for all industrial ills. It was inevitable, then, that the way to improve on the spray method was to invent a dry powder which could be sifted on the surface of the pie, and would, under the heat of the oven, develop into a beautiful, appetizing golden color.

A few mixtures were made of powdered sugar, powdered skim milk and shortening. They could be prepared so that they passed through a sieve fairly well, but instead of producing an even color on the crust of the pie, there resulted only a series of spots and blotches. The pies appeared to have the measles.

The powder could be sifted on uniformly enough, but I could discover nothing to prevent the uneven mottled appearance from developing during the baking process. With the thought that the trouble might be due to the fact that shortening was being used as a spreader, water was substituted for it. To do this, the mixture had to be frozen, of course, and then sifted on in the form of finely chopped ice. Results were much better in the sense that more even coloration took place, but the application entailed too much difficulty and was too far outside production procedure to be practicable. Moreover, the color attained was far from being the equal of that gotten with the spray method. Shortly after, work on the idea was abandoned.

The experience with the attempt to color pie crust with a dry powder, however, stood us in good stead some time later when another problem came into the laboratory. The production department had developed what they considered a very nice fondant icing. They wanted to put it on a rather moist cake of the pound-cake type.

Cake-icing Episode

Preliminary tests had shown that the iced cake could not be wrapped immediately after icing—which was what Production wanted to do, naturally. And even if the icing were allowed time to set be-

fore wrapping, the moisture present in the cake was great enough to soften the icing sufficiently to cause sticking some hours after the cake was wrapped. Production did not want to change the cake formula to a drier type; it was cheap, very good eating and of good keeping quality. They did not want to change the icing for very much the same reasons.

After the manner of production departments from the beginning of time, what they wanted from the laboratory was a solution to their problem which would be completely satisfactory, but require no concessions from the standpoint of the product.

The dry powder idea had not been successful with pies. It did seem to have possibilities with this fondant icing, though. Any powder used, however, would have to be edible; tasteless or with a pleasing taste; either greatly water absorbent, to take care of the surface moisture on the fondant icing, or treated in some way so that it was water repellent.

From the beginning, 6X sugar was the only material seriously considered. Starch, flour and powdered gelatinized starch were all turned down on the ground of the objectionable taste they would introduce. The material used had to be either tasteless or with a pleasant taste, and consequently powdered sugar looked like the best bet. Nevertheless, it obviously could not be used alone because in itself it was sufficiently hygroscopic to cause sticking under the circumstances in which it would be used.

The dusting powders already on the market, commonly used for powdering doughnuts, crullers and the like, had already been tested and found to be of no value. Without exception they were fluffy, which means that they packed instead of flowing freely through a vibrating sieve, and in less than 24 hours they had taken on enough moisture to stick to the wrapper.

In addition to the qualities already decided upon, it would be necessary that our ideal powder should be dry enough and granular enough to pass easily through a screen or sieve.

By that time it was fairly certain that the powder had to be some combination of fat and sugar. Powdered sugar was soaked in 110-deg. F. coconut oil, and the excess oil drained off. The results were promising, though the product obtained was difficult to reconvert to a dry powder and was, in fact, far from being free flowing in a warm atmosphere. There were, however, three all-important points in its favor. The powder was almost completely insoluble in water, yet it dissolved in the mouth, leaving a pleasantly sweet taste. When dusted on Production's fondant, it did a perfect job of preventing any sticking of wrapper to icing.

It was, in fact, the answer to the problem—except for the strictly "minor" details that in the shape the laboratory had it the stuff could not be made cheaply, nor when made could it possibly be used under production conditions.

In the end, after some further messing around with various types of fats—and a complete change of mind regarding the quantity of fat needed—the bottleneck was cracked. Palm flakes, or any fat of approximately 140-deg. F. melting point, was used as the coating material—in the ratio of about one part of fat to four or five parts of sugar. The hot melted fat was added to the powdered sugar and mixed thoroughly by machine. Then, while still very hot, the mass was compressed into blocks. As a result of this treatment, the fat completely coated the sugar. When the blocks were cold they were easily powdered over a grater, and the resulting powder was both fine and free flowing. It was not affected by either the temperatures nor the humidity ordinarily encountered in production. A teaspoonful of the powder could be left floating on the surface of a beaker of water for days without any reaction, yet when taken into the mouth the powder dissolved immediately. When dusted on the iced cakes, it performed perfectly. Verily, it was the "dry powder" triumph!

Was it possible, Sales inquired of the Lab, to develop an attractive odor which could be put on the boxes in which the cakes were displayed?

Some years after the successful solution of this problem, I ran across Patent 2,320,831, which was granted in June, 1943, to John W. Schlegel and Louis Lang and assigned by them to the National Sugar Refining Co., Edgewater, N. J. This patent covers a process for coating powdered sugar with a high-melting-point fat or wax so as to improve its properties for use as a dusting powder on doughnuts. The method used and the end attained were much the same as those achieved in the writer's laboratory.

Pan-grease Engineering

The greasing of cake pans was the center of another group of ideas. Greasing is an operation preliminary to the deposition of batter in the pan and is intended, of course, to prevent the cake from sticking to the pan after baking is completed. Such sticking, even if mild, slows up the dumping operation, and when severe, results in considerable loss due to damaged and broken cake.

Greasing of the pans prevents sticking, but at the same time it introduces several disadvantages. Though thin, the layer of oil on the pan markedly decreases the volume of the cake being baked in the pan. The same weight of batter will produce a cake of greater volume when baked in an ungreased, rather than a greased, pan. This is because the cake batter, expanding during the baking process, finds support for itself by sticking to the walls of the pan as it climbs upward. The film of pan grease, by making such adhesion impossible, forces the expanding batter to support its own weight, and this results in lowered volume.

Another disadvantage is that the pan grease itself too often introduces a flavor note which is not particularly appetizing. Probably more times than is admitted, the flavor of pan grease on the finished cake is the greatest single point of difference between homemade cake and "baker's cake."

It was thought, therefore, that possibly some other means than pan

grease could be found to keep cakes from sticking. An effort was made to coat the surface of the pan with a thin layer of paper pulp, which theoretically would dry to a non-sticking film during the baking process. The idea, too, was to make the layer of paper so thin that it would make no appreciable difference in the eating of the cake. However, in practice the thing was distinctly a flop. The layer of paper pulp could be put on, but if anything the cakes stuck worse with it than without it. And as for the effect on eating quality—just try ending a bite of luscious cup cake with a cud of paper pulp!

Since it seemed likely that the attempt to substitute something else for pan grease was going to be a failure, experiments were carried on simultaneously to discover the effect of decreasing the amount of grease used down to the point where sticking first occurred. This was easily controllable simply by varying the draining time after the pan had passed over the greasing machine. With less grease on the pan, the volume of the cake increased, as was expected.

Quite unexpected, however, was the effect on the keeping quality of the cake. Those cakes baked in the lightly greased pans became drier and staler much faster than the cakes from the more heavily greased pans. It looked as though the oily film left by the pan grease on the crust of the cake had the effect of retarding the staling of the cake by sealing in, to a certain extent, the moisture in the cake.

Consequently, that angle of the experiment was dropped, though it served to point up the importance of the fact that the amount of grease in the pan was a variable which had to be balanced in relation to the three factors of sticking, cake volume and cake keeping quality.

The other phase of the experiment, namely that the pan grease was often responsible for the presence of off-flavors in the cake, was still alive. As part of the effort made to introduce a pleasing flavor note, a small amount of butterfat was added to the pan-grease formula. This proved to be a successful addition, in those days before rationing, particularly when used with chocolate cakes. For greasing cakes other than chocolate, the inclusion of approximately 0.01 per-

Probably the wackiest brain-child ever foisted on the author was what came to be known as the Episode of the Wilted Waffle.

cent of vanillin was an effective means of improving the flavor.

Once, in carrying out some work on fillings for fig bars, it was noticed that the ground figs, after extraction of the seeds, had a remarkably butter-like taste and texture. Most bakeries, of course, are very interested in the problem of butter flavor, and it seemed that something might be done with fig paste along this line. A few test bakings showed, however, that the flavor imparted, while pleasantly butter-like, was too weak to be of value.

Why Pans Anyway?

An idea which never got beyond the point of being kicked around in several laboratory "back-room" discussions deserves some mention here. Why, the question was asked, must cakes be baked in pans? Why not deposit the batter in some type of temporary mold—the way the candy industry uses starch molds for casting centers, for example—and at one fell swoop dispense with the large investment in metal pans, the bother of greasing and cleaning them, the need for repairing them, and so forth? That was the basic idea. The many advantages of the arrangement were enthusiastically heralded, while the formidable obstacles in the way of making it a success were tacitly overlooked. Perhaps it was the stunning simplicity of approach about the idea that made it a favorite topic of back-room discussion for a few sessions. But, as I said, nothing was ever done about it.

I believe it already has been pointed out by Thurman Arnold, or by one of the other heavy thinkers of the day, that deep in the "folklore" of capitalism is the belief that if a company has been successful in one line of endeavor it will be equally so in another.

This beguiling speculation, plus the inescapable fact that most people eat breakfast every morning, was combined with a laboratory idea for crashing the breakfast-food market. The amount of heavy machinery required to produce a corn flake, for instance, seemed out of all proportion to the finished product, in the opinion of the laboratory. Battleships or tanks would have appeared more fitting.

Synthetic Corn Flakes

The idea was to make a synthetic corn flake from either a batter or dough which could be spread in a thin layer by extrusion through a die, or by passing through the rolls of a cookie machine. Small pieces having the outline of corn flakes might be cut from this layer of dough, or the pieces might be cut into distinctive shapes of their own. But when these pieces were passed through a toasting chamber, the result was supposed to be something having very much the quality of a corn flake.

Practically every dough that was tried, however, was a complete failure. When rolled thin enough, the material was too fragile, and even then the flakes did not crisp up satisfactorily upon toasting. Only in one direction was even a glimmer of success attained, and this was with a cooked starch paste which had been run out in thin sheets, allowed to dry partially so that it could be handled and then toasted. Upon the application of heat, this material, probably because of the moisture within it, did puff slightly and develop something of the crisp crunchiness of a corn flake. But at this point the company rather wisely decided that they had had their little fling with the folklore of capitalism and closed the books on breakfast food.

Cake Perfume

It has been a matter of some concern to many a sales promotion manager that the wrapping put on a cake to keep it fresh also prevents the customer from getting a sales' compelling whiff of mouth-watering, just-baked aroma. Was it possible, Sales inquired of the Lab, to develop some attractive odor — a

(Turn to page 138)

Alkali-Hydrolyzed Pectins Are Potential Industrial Products

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PART I—Research on pectinic acids lays foundation for their postwar commercial use in the making of salads, desserts, puddings, pie fillings and dry dessert mixes. The authors discuss their characteristics

IN recent years considerable research has been focused on the development of pectic substances which form gels in the presence of low concentrations of sugar. The trend in these studies has been toward modification of ordinary pectin through partial de-esterification to yield low-methoxyl pectins — commonly referred to as pectinic acids— which depend upon their reaction with a metallic ion such as calcium to cause gelation, rather than on a high concentration of sugar as with ordinary pectin. The objective has been an increase in the use of pectin in food products other than in the usual types of jellies and jams. For the pectin industry this new use will be especially important in the postwar readjustment period, particularly since pectin manufacturing capacity has been approximately doubled since the beginning of the present conflict to meet requirements.

The characteristics of low-methoxyl pectins permit them to compete in fields long occupied by gelatine and the starches. Gels prepared with the low-methoxyl pectin we shall describe are palatable, smooth and firm, without rubbery or pasty consistency. Their preparation requires little time. Only a very short period of heating is required to dissolve the pectinic acid and gelation occurs rapidly on cooling without refrigeration. The fact that during preparation these pectin products remain very fluid offers an additional advantage. This pectinic acid is versatile; its properties are such that it gels with milk and also with fruit and vegetable products.

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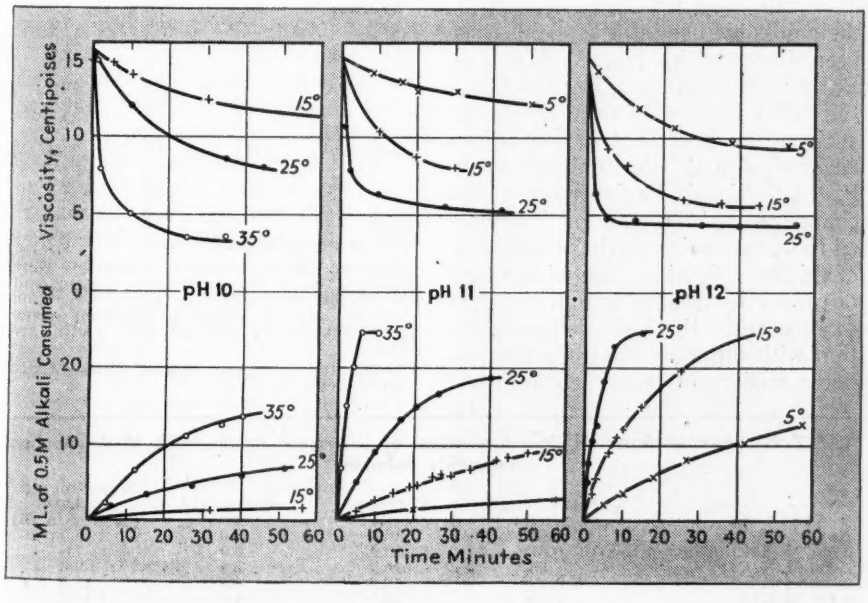


FIG. 1. Rates of de-esterification with sodium hydroxide and concurrent changes in viscosity.

Three Methods

Removal of methoxyl groups from the pectin molecule can be accomplished by hydrolysis catalyzed by acid, by an enzyme of the esterase type or by alkali. The acidic method of hydrolysis has been used since 1929 to produce pectins of the slow-set type[1]. Modifications of the method[2,3] have made possible the preparation of low-methoxyl pectins which can be used in low-sugar gels with fruit and vegetable juices. The acidic method has the disadvantage

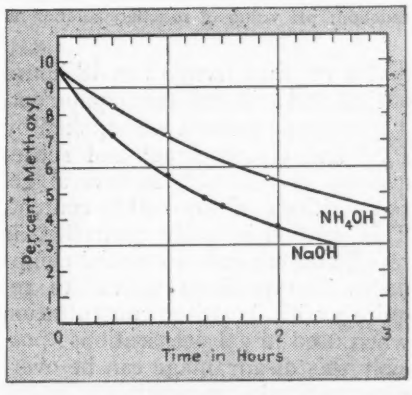


FIG. 2. Effect of sodium hydroxide and ammonium hydroxide on rates of de-esterification at 15 deg. C. and pH 11.

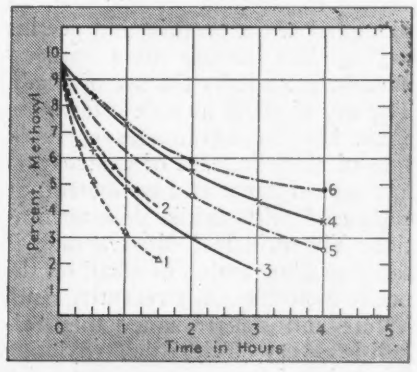
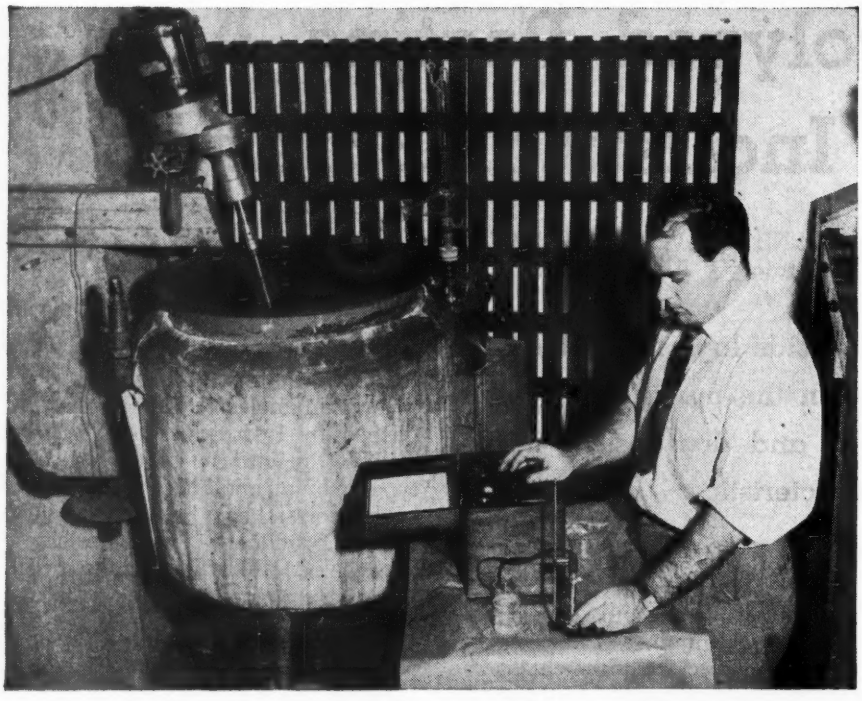


FIG. 3. Effect of sodium chloride on rates of de-esterification with ammonium hydroxide. The reaction conditions of the curves shown are: (1) NH_4OH and 0.1 M NaCl, pH 10.7 and 25 deg. C.; (2) NH_4OH, pH 10.7 and 25 deg. C.; (3) NH_4OH and 0.1 M NaCl, pH 10.9 and 15 deg. C.; (4) NH_4OH, pH 10.9 and 15 deg. C.; (5) NH_4OH and 0.1 M NaCl, pH 11.7 and 5 deg. C.; (6) NH_4OH, pH 11.7 and 5 deg. C.



Successful alkali de-esterification of pectins requires positive control over the rate of reaction; pH value of reacting solution is a determining factor.

that it requires from 12 to 48 hours of time and acid-resistant equipment. The enzymic method was applied by Paul and Grandseigne[4] and subsequently by others[5,6], in several gel compositions of low-solids content. This method is easily controlled, is rapid, and requires no special equipment. The products appear to require a critical calcium concentration when used in gel preparations; possibly this disadvantage can be overcome by further research.

The alkaline method has generally been used for the preparation of pectic acid (completely de-esterified pectin) rather than pectinic acid, although slow-set pectins[7] and pectins having low setting temperatures[8] have been made by the use of alkali. The use of alkali as a de-esterifying agent has the advantages of rapid rate of reaction, ease of control and low cost of agent and equipment, as compared with acidic de-esterification. The principal disadvantage is the degrading action of alkali on the pectin molecule. Only recently, Hills, White and Baker[6] stated that "alkali is a very efficient demethylating agent but it causes such extensive degradation of the pectin molecule that it cannot be used for making pectinates of high jelly strength." Although others have reached similar conclusions, a search of the literature yields only meager quantitative data. The method offers many possibilities, provided conditions are established where de-esterification of the pectin takes place at a reasonable rate while at the same time degradation of the pectin molecule is not so extensive as to yield products which do not form gels of high strength and good texture. Pectinic acids with methoxyl contents of 2.8 to 4 percent and viscosities of 6 to 9 centipoises in a 1 percent solution at 25 deg. C. are satisfactory for the preparation of good products under the conditions of acidity and calcium ion content naturally present in milk and most fruit juices.

The use of low-methoxyl pectins in certain food products, as well as their possible use in other fields, has been discussed by Hills, White and Baker[6] and Kaufman, Fehlberg and Olsen.[9] A number of these products, such as are described in the references cited and "Pectin LM" made by the California Fruit Growers Exchange, have been examined or called to our attention during the course of this investigation. The wide range of properties attainable in low-methoxyl pectins through de-esterification with different catalysts and under a variety of reaction conditions makes possible the preparation of products of great versatility. They will find many uses when commercially available.

Rates of De-esterification

The pectin used in the rate studies we are reporting was a 185-grade commercial citrus pectin containing 2 percent of ash, 3 percent of moisture and 9.8 percent of methoxyl. A 1 percent solution had a viscosity of 15.4 centipoises at 25 deg. C. The rates of de-esterification and degradation of pectin were carried out at 5, 15, 25 and 35 deg. C. at pH values of 10, 11 and 12, according to the following procedure: 400 ml. of 1 percent pectin solution was adjusted to the desired temperature, a glass electrode assembly inserted to follow the pH changes, and 0.5 N sodium hydroxide added with stirring. When the desired pH value was reached, the initial reading was taken and alkali added continuously at such a rate that the pH of the reaction medium remained constant throughout the experiment. The temperature was also maintained at a constant value. The accuracy of the titration data shown in the rate curves was no better than 10 percent at pH 11 and 12, since the addition of a few tenths of a ml. of 0.5 alkali did not materially change those values. The rates of degradation were determined by measuring the de-

TABLE I—Rate Reaction Constants for De-esterification of Pectin.

Catalyst	pH	Temp. deg. C.	Reaction rate constant ($\times 10^3$ min. $^{-1}$)
Alkali (sodium hydroxide)	10.0	15.0	1.2
		25.0	5.9
		35.0	24.0
	11.0	5.0	2.0
		15.0	9.0
		25.0	49.0
	12.0	5.0	15.0
		15.0	69.0
Citrus esterase[1]	7.0	0.0	30.0
		16.5	60.0
		24.5	80.0
		35.0	105.0
		45.0	120.0
Acid[2] (hydrochloric)	0.3	50.0	0.7

[1] Data on the citrus pectin esterase[10] were obtained on a heterogeneous system and the values calculated for the rate reaction constant are likely to be different when purer sources of enzyme and pectin are used.

[2] Calculated from the data of Hills, White and Baker[6].

TABLE II—Effect of Salts on De-esterification of 1 Percent Pectin—0.33 M Ammonium Hydroxide Solution.

Additions	Ionic strength of salt	Corrected pH	Methoxyl,[1] percent	Reaction rate constant ($\times 10^3$ min. $^{-1}$)
None	0.00	10.9	7.0	5.0
0.010 M NaCl	0.01	10.9	6.0	7.8
0.050 M NaCl	0.05	10.9	5.4	9.6
0.100 M NaCl	0.10	10.9	4.8	11.5
0.100 M KCl	0.10	10.9	4.8	11.5
0.033 M $MgCl_2$	0.10	10.8	4.0	14.6
0.033 M $CaCl_2$	0.10	10.9	2.0	26.1

[1] On an ash-free basis and dried for 12 hours at 70 deg. C. in vacuum.

When desired reaction is completed, acidified 95 percent alcohol is added as a precipitant for the low-methoxyl pectin.

crease in viscosity on separate portions of pectin solutions under conditions comparable to those of the corresponding de-esterifications. One liter of 1 percent pectin solution was adjusted to the required temperature, the pH brought to the desired alkalinity with 3 N sodium hydroxide, and 100-ml. samples were withdrawn at definite time intervals and adjusted to a pH of 7 and a temperature of 25 deg. C. Sodium hexametaphosphate (0.25 gram) was added to minimize the influence of polyvalent cations that might be present as impurities and to reduce the electroviscous effect. The viscosity was determined in a Stormer viscometer.

Rates of de-esterification and change in viscosity at various pH values are shown in Fig. 1. The curves represent averages of two or more series of determinations. The results could be duplicated within 10 percent. The specific reaction rates were calculated from slopes of straight lines obtained in plots of the logarithms of the milliliters of alkali consumed (or the methoxyl content) against time in minutes. The rate constants given in Table I are compared to values obtained by means of other hydrolyzing agents.

De-esterification of pectin by means of acid is slower than that by alkali or esterase under the conditions shown in Table I. At pH 10 the temperature coefficient for the rate of degradation is somewhat higher than that for the rate of de-esterification. For that reason a temperature of 15 deg. C. or less should be used to obtain a desirable product. At pH values of 11 and 12 the temperature coefficient for de-esterification is the higher. However, the rates were so high at these pH values that a temperature of 5 deg. C. or less is necessary in preparing a useful low-methoxyl pectin.

In the preparation of products at pH values near 11 the use the ammonium hydroxide offers the advantage that a pectinic acid of low ash content can readily be prepared, since ammonium chloride formed by neutralization of the excess alkali with hydrochloric acid is readily soluble in 50 percent alcohol and can be easily removed by washing. An additional advantage is offered by the use of a weak alkali such as ammonium hydroxide at pH 11, because the pH is maintained constant without the addition of alkali during the reaction when an excess is added. The rate of de-esterification obtained with ammonium hydroxide was much slower than predicted from the results with sodium hydroxide at the same pH and temperature. This difference is illustrated in Fig. 2 where a comparison of the rate of de-esterification curves for ammonium and sodium hydroxides at 15 deg. C. and pH 11 is made.

The specific reaction rate is 5×10^{-3} minutes^{-1} with ammonium hydroxide at pH 11 and 15 deg. C., compared to 9×10^{-3} with sodium hydroxide. If the ammonium hydroxide is made 0.1 M with respect to sodium chloride, as shown in Fig. 3, the constant is increased to 11.2×10^{-3} minutes^{-1}.

This interesting phenomenon had been observed by Lineweaver and Ballou[11] in connection with work on a pectinesterase. They found that alkaline de-esterification rates increased several fold in the presence of cations, the increase depending on both the cation and its concentration.

This increase in rates in the presence of sodium chloride is not due to a pH effect, since corrections were made for temperature and sodium ion on the glass electrode.

To ascertain the effect of other salts on de-esterification of pectin, a preliminary series of experiments were carried out as follows: Ammonium hydroxide (0.33 M) was added to pectin solutions (1 liter of 1 percent) containing sodium chloride in varying amounts and potassium chloride, magnesium chloride or calcium chloride in concentration of 0.1 ionic strength. The temperature of the reaction mixture was maintained at 15 deg. C. The pectinic acids were isolated after 1 hour and their methoxyl contents (using Hinton's method[12]) and viscosities were determined. The results are summarized in Table II.

From the methyl ester analyses and from the rate constants, the order of effectiveness to increase the rate is Ca> Mg> Na, K. Since the pH and ionic strength were constant throughout, this increase in rate must be the result of a specific cation effect.

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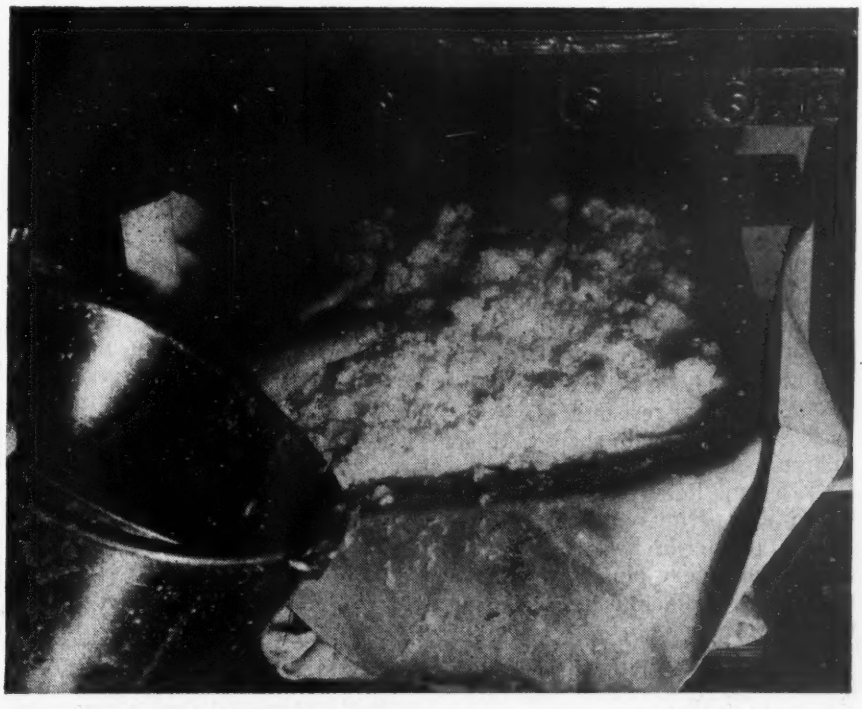


After standing an hour following precipitation the pectinic acid is transferred to a hydraulic press rack.

Bacterial Analysis Speeded By New Culture-Flask Technic

By GEORGE BELL, Director of Laboratory, Meadowmoor Dairies, Inc., Chicago, Ill.

With this greatly simplified agar-plate method, counts not only are obtained quickly but there is differentiation between heat-resistant and non-heat-resistant microorganisms. Chances of contamination eliminated

ONE universally used measure of milk quality is its bacteria content. How to best determine the count is a much discussed question among sanitarians and dairy-laboratory technicians.

The agar-plate method has been used in an official way longer than any other technic for determining bacterial populations. But at best, agar-plate counts per cubic centimeter of milk are estimates of numbers of bacteria rather than exact counts because of inherent limitations and because only a portion of a cubic centimeter of milk is used in preparing the plates. Like all estimates, these counts are subject to well-known errors, and allowance has to be made for them. The greatest handicap that the method has is that of being very complicated for practical application at the milk receiving station, especially where milk from a large number of individual producers is received. There also is difficulty in determining what proportion of the colonies is composed of heat-resistant microorganisms.

As a step to overcome these handicaps, the Bell culture flask method has been worked out. It is a greatly simplified agar-plate method. It centers around a culture flask designed by the author.

Made of heat-resistant glass, the flask is rectangular in shape and has the same inside surface area as a 100x15-mm. Petri dish. The offset, round neck permits incubation using 10 c.c. of sterile tryptone-glucose-extract-milk agar plus 0.001 c.c. of milk without likelihood of wetting the cotton plug.

In application, the Bell flask procedure is as follows:

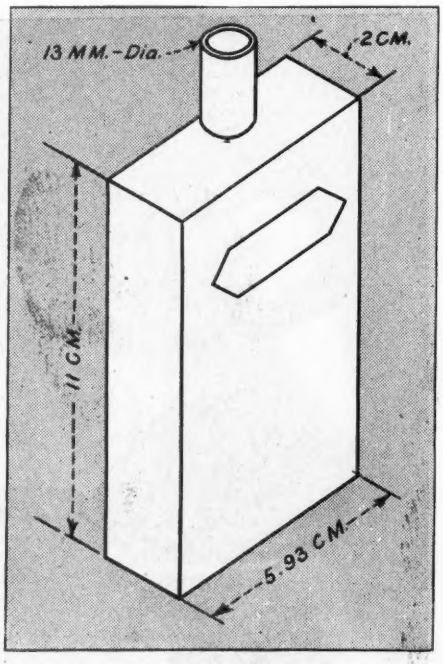
1. Place 10 c.c. of tryptone-glucose-extract-milk agar in the Bell culture flask and stopper with a non-absorbent cotton plug in the mouth of the flask. The preferred reaction of the media is pH 7.0.

2. Sterilize media at 121 deg. C. in steam at 15-lb. pressure, for not less than 20 minutes, in an autoclave equipped with an accurate thermometer and an accurate pressure gage.

3. Following this preparation the flask can be taken to the receiving station.

4. At the receiving station, liquefy the media by placing the flask in boiling water. Cool the liquid media in a water bath to 45 deg. C. and then keep it at that temperature.

5. Flame the calibrated Burri loop, remove cotton plug and inoculate with 0.001 c.c. of the milk being tested. Replace the plug and shake flask gently, while holding it at an angle with the deep side downward, finally allowing it to rest horizontally on the deep side. Solidification takes place in a few minutes. With the flask prepared beforehand, this step of inoculation requires only a few seconds, and milk from a large number of producers can be sampled and tested without hampering the receiving operations.



Bell culture flask, 100-c.c. capacity. It is made of heat-resistant glass, is rectangular in shape and has the same inside surface area as a 100x15-mm. Petri dish.

6. If a further study of heat-resisting types is desired, duplicate flask inoculation can be made. The duplicate flask can be heated in a water bath to pasteurizing temperature and allowed to cool for incubation.

7. After 48 hours of incubation at 37 deg. C. the colonies are ready to be counted. The number of colonies is multiplied by 1,000 to obtain the colonies of bacteria per cubic centimeter of milk.

8. An added advantage of this method is that the flask can be taken out to the producer. The importance of the difference between clean and contaminated milk can be illustrated to him and substantiated by evidence.

This procedure is the latest development in determining milk quality at point of intake. Since its inception, judging the quality of milk by its bacterial content has gone through numerous progressive steps.

In 1910—in the first report of the committee of the Laboratory Section of American Public Health Association on standard methods for bacterial examination of milk—beef infusion was recommended for use in the standard media. In the second report in 1916, the committee substituted beef extract for beef infusion, recommending that Liebig's brand be used when available. In 1927, Difco beef extract was recommended. However, all editions of "Standard Methods of Milk Analysis," up to the sixth in 1934, allowed the use of beef infusion where previous records and standards had been based on counts from infusion agar. The sixth edition definitely designates the use of beef extract with no provision for the use of beef infusion.

A problem which is closely allied to the question of the use of beef infusion is the type of peptone recommended. The recommendation that peptone be included in the standard agar for milk analysis has undergone various modifications, as has

been the case with beef extract. The first report of 1910 called for 1 percent of peptone in the agar, and did not designate any particular brand of peptone. Later, in 1921 and 1923, a 0.5 percent of Witte, Armour, Digestive Ferments Co. or Park Davis & Co. peptone was recommended. The fifth and sixth 1927 and 1934 editions have designated Bacto Digestive Ferments Co. peptone or other comparable brands.

Since July 1, 1939, a new standard medium has been recommended. Known as the Bacto typtone-glucose-extract-milk agar, it has the following composition:

Bacto agar	1.5 percent
Bacto beef extract	0.3 percent
Bacto tryptone	0.5 percent
Bacto glucose	0.1 percent
Skim milk	1.0 percent
Distilled water	to volume
Reaction	pH 7.0

The various methods and technics used in detecting the number of bacteria are well described in the eight editions of the standard methods for the examination of milk, published by the American Public Health Association. Each of the methods recommended has its merits and its limitations. The methylene blue reductase test does not give us any way near the numerical classification of the active bacteria present, especially when heat-resisting organisms are present. The direct microscopic method often misrepresents the bacteria count, because dead and living organisms often look alike under the microscope.

Of these various methods and technics, the methylene blue test, the direct microscopic test and the agar-plate count are now in common and official use. Each serves its purpose, but results are not conclusive. These methods also are time consuming, particularly the agar-plate count, which involves special sampling and the use of much laboratory ware.

Through the use of the culture-flask technic, counts are obtained in relatively a very short time. Furthermore, a differentiation is obtainable between the heat-resistant and nonheat-resistant microorganisms present.

Comparisons of the counts obtained by the flask methods with those of the official plate method show variations within the limits of probable error. The flask method uses the same official culture media; the time of culturing is cut to a fraction of that required for the plate method; and the possibility of contamination during the making of dilutions and the numerous transfers is fully eliminated by the greatly simplified technic of the flask method.

More Accurate Test For Butterfat

By B. I. MASUROVSKY, Consulting Dairy Chemist and Technologist, New York, N. Y.

The Paley bottle with its closer graduations gives better results. The author explains how to use it. The higher accuracy may prevent considerable loss

BUTTER is an outstanding source of milk fat for ice cream making, and it is being used more today, because of the restrictions on fresh and frozen cream.

The amount of butterfat present in a given butter, regardless of the grade, is an important criterion in figuring the cost of milk fat purchased for this and similar uses. This is determined by laboratory test.

A quick method used in the creameries is based upon a rapid moisture determination and an approximation of the butter curd, calculating the milk fat by difference. For example, if the moisture content of the butter is 17 percent and the curd is 1 percent, a total of 18 percent, then 82 percent (100 — 18) is considered to be butterfat.

In the Babcock method, the percentage of fat in a given weight of sample is read volumetrically by the use of a calibrated glass test bottle. In applying this test to butter, the preparation and weighing out of a fair sample and the introduction of the sample into the test bottle present difficulties. The ordinary Babcock test can be used with only a fair degree of accuracy for butterfat in butter.

One of the major difficulties is that the smallest graduation of the scale on the neck of the bottle is 0.5 percent. This low degree of accuracy involves the possibility of considerable loss to the manufacturer using butter as a source of butterfat. The loss on every 200 lb. of butter used may be in the neighborhood of 1 lb. of butterfat, or, for ice cream manufacture, the equivalent of 1 gal. of an ice cream mix testing 10 percent butterfat. With production of 2,000 gal., the loss may amount to the equivalent of one can, or 10 gal., of mix. This increases, of course, as production is stepped up.

The use of a test bottle having a tolerance of 0.2 percent in the graduated scale of the neck is recommended.

The "Paley" bottle is an improved test bottle for butter, permitting more accurate readings. The method of conducting the test is similar to that with the Babcock bottle.

The method for testing for percentage of fat, using the Paley bottle, is as follows:

1. Weigh 9-g. of butter, properly prepared to the consistency of mayonnaise, into the test bottle.
2. Melt the butter in a warm place until the fat separates and a visible curd appears.
3. Add 10 ml. of hot water; place the stopper in the bottle and mix thoroughly.
4. Add about 10 ml. of Babcock sulphuric acid. Mix well and let stand for 5 minutes.
5. Centrifuge for 5 minutes in a hot centrifuge.
6. Shake well.
7. Add hot water almost to the neck of the bottle, as for milk, and shake vigorously until all visible curd is dissolved. Now allow it to stand for a few minutes. If the fat and the bottom portions are almost the same color, and if on shaking again no flakes appear and the fat column is clear, then continue with centrifuging for 3 minutes. If there is any doubt of the complete solution of the curd, place in a water bath at 140 deg. F. for 5 minutes, shaking intermittently until no flakes appear.
8. Centrifuge for 3 minutes.
9. Remove and shake vigorously.
10. Add water to about the 80 percent mark. Centrifuge for 10 minutes.
11. Adjust the bottom of the fat column to about zero, place in water bath at about 140 deg. F. for 5 minutes, then adjust the bottom of the fat column to zero and add glymol.
12. Read the fat column in the usual manner in the graduated portion of the neck of the test bottle.

The construction of the Paley test bottle allows all these operations to be carried out without much difficulty, and eliminates some of the errors that creep into the mechanical manipulations of preparing the sample.

It has been difficult to obtain all the workers needed in a canning plant, such as this one, with the pay rates limited. It is important, therefore, that canners know under what circumstances increases are permitted. Those conditions are outlined in this article.

When Wages May Be Increased*

Many food processors have been handicapped in hiring and holding workers by the rate of pay permitted by WLB. But in many instances increases still are permissible. This article, from WLB, is a guide to what can and can't be done

UNDER the impetus of war production, wages in industrial plants gradually increased as the manpower shortage became more acute. Many employers were willing to grant these increases because that appeared to be the simplest way to settle industrial relations problems and production difficulties. But that way led to inflation and disrupted production schedules when workers moved from job to job, attracted by higher wages.

So Congress passed the Emergency Price Control Act and later the Economic Stabilization Act, authorizing the President to stabilize prices, wages and salaries. To the War Labor Board was handed the job of controlling wages, in addition to its task of maintaining industrial harmony.

Wages in the food processing industry had shared in this upward trend. Workers engaged in canning fruits, vegetables and fish found their wages increased from an average of 51 cents an hour in January, 1941, to 66.4 cents in October, 1942. Their average work week increased from 33 to 38 hours.

In spite of its excellent production record, the food industry has had its manpower problems and in some cases acute shortages. The industry's relatively low wage structure made competition with war plants even more difficult after wage stabilization. This makes it especially important for food processors to know just how the national wage controls work.

Increases Permitted

Although most firms, particularly those in war industries, have granted their workers increases since the January, 1941, base period, this does not mean that wages may not be increased even now. The National War Labor Board approves increases in the following circumstances:

1. General wage increases related to the cost of living and limited to the 15 percent permissible under the Little Steel formula.

2. Voluntary increases to correct substandards of living up to 50 cents an hour.

3. Increases to correct inequities in rates paid for similar work in various plants of the same community. Raises may be given up to the minimum of what the regional War Labor Boards have found to be "sound and tested" rates paid for the job in that area and industry.

4. In rare and unusual cases affecting prosecution of the war, the Board may grant increases above the minimum of sound and tested rates. Such increases are rarely granted, and a showing must be made that critical war production cannot otherwise be obtained.

5. Increases to correct inequities in the wage structure of a single plant may be made through reclassifications, promotions, merit or service schedules, or through production incentives. Such increases are always subject to the limitation that they must not increase the level of production costs appreciably or furnish the basis either to increase prices or to resist otherwise justifiable reductions in price.

Specific Cases

The Board has approved vacation schedules providing one week's paid vacation after a year of service and two weeks' after five years of service.

On March 24, 1944, the Board approved increases in vacation and sick leave benefits for the 20,000

*Prepared exclusively for "Food Industries" by the Division of Public Information of the National War Labor Board.

employes of Swift & Co. in its plants throughout the country.

Prior to the Board's approval, the company's vacation schedule called for the computation of vacation pay on the basis of a 40-hour week except in the cases of workers who are not subject to the 40-hour limitation. The Board approved an agreement which provided that employees who would have earned more pay by remaining at work, because of overtime, were to be paid the difference between the pay already received and the amount earned by the employees on the same jobs as a result of overtime.

The Board also approved a sick leave plan for Swift & Co., which provided that employees with more than a year of service could receive two weeks' sick leave at half wages regardless of their seniority beyond the first year. In addition to these vacation and sick-leave plans, the Board also authorized payment at regular rates for attendance at union grievance meetings during the regular work day. An agreement also was made to pay overtime rates at time and a half when employees were called back to work after they have left for the day.

Pay differentials for different shifts may be approved by the Board if it is consistent with the prevailing practice in the industry and area. For instance, the Board approved a 5-cent an hour differential for night shift workers at the H. J. Heinz Co., in its Pittsburgh plant.

To illustrate a decision which eliminated intraplant inequities, the Board ordered a 2½-cent-an-hour raise for the salmon canning industry in the Pacific Northwest. This increase served to correct inequities resulting from higher rates paid to cold-storage workers.

Most of the lowest wage earners in the food packing industry have now had their wages increased by the setting of a 40-cent-an-hour minimum, under the Fair Labor Standards Act, for all workers in the fruit and vegetable packing and farm-products industry. About 10,000 of the 150,000 workers in this industry are affected by this 40-cent minimum wage.

The Board does not have to approve customary bonuses if the amount is not greater than that given last year, or the method of computation for percentage bonuses is not changed.

If premium pay for time worked after 40 hours is not required by the Wage and Hour Law, the firm may apply for approval from the War Labor Board.

Increases Without Approval

Some wage increases are permitted without WLB approval. Promotion raises may be granted, with the limitation that the worker cannot be increased more than the minimum of the range of the new job, or 15 per cent above what he was being paid, whichever is higher.

Merit or service increases may be given without Board approval under the provisions of a promotion schedule which records show was in existence before July 1, 1943. In the case of employers of 30 or fewer employees, Board approval is not required for individual merit and service increases, even without such a schedule, but the increases cannot exceed 10 cents per straight-time hour during the year, and the total amount expended cannot exceed an average of 5 cents per straight-time hour for all employees in the establishment whose rates are under WLB jurisdiction.

These individual increases cannot be made the basis for application for other increases to eliminate intraplant inequities and cannot be contrary to the terms of any collective-bargaining agreement the employer has with any or all of his employees.

Increases may be given without WLB approval in establishments employing eight or fewer workers, except in specified industries, unless the employees are covered by a master bargaining agreement.

Increases up to 40 cents an hour may be granted without the approval of the War Labor Board.

Increases may be given without WLB approval to equalize rates paid to women for work of the same quantity as work done by men in the same plant. Such adjustments must not furnish the basis for price increases.

A bonus payment made by an employer to an employee severing his employment to enter the armed forces does not require WLB approval.

Since the canning and packing of fruits and vegetables is quite often paid for on a piece-rate basis, incentive plans may also be of interest to the industry. The Board will approve incentive plans only on voluntary application. Evaluation of wage increase plans will be limited to a determination of whether or not they would result in unauthorized wage-rate decreases or increases or an increase in the general level of production costs.

Board approval is needed before modifying a permanent production standard if the job content has not been significantly altered. The wage-stabilization policy requires that an incentive plan be based on a reasonable measurement of employee efficiency. It must be remembered that an incentive plan is not an automatic solution to either production or wage problems. Its success depends almost entirely upon the manner in which it is handled. A well-operated plan can increase production, while a poorly operated plan can lead to confusion, unrest, lowered production and violation of the regulations.

Not Under WLB

Certain types of pay increases are not under the jurisdiction of the War Labor Board. They include:

(1) Salaries above $5,000 a year or supervisory employees not represented by a union. (2) Increases to meet requirements of Federal or state laws. (3) Increases to Federal, state, county and municipal employees. (4) Increases to employees of nonprofit organizations, (5) to employees subject to the Railway Labor Act and (6) to farm workers.

Such is the picture of wage controls in a democracy at war. That maintenance of these controls will not be necessary after the war is the fervent wish of the WLB.

Wage adjustments to workers in meat plants have been permitted in various forms by the WLB. When and why are explained in this article.

Production Up, Breakage Down With Incentive Wage Plan

By AL FUNKE, Design Engineer, and A. B. UBER, Superintendent,
The P. J. Ritter Co., Bridgeton, N. J.

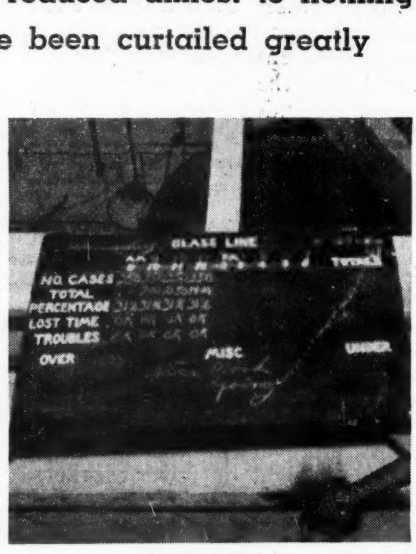
Employees work surprisingly faster at Ritter's when paid a bonus for increased output. Not only that, the breakage of glass jars has been reduced almost to nothing and delays for repairs have been curtailed greatly

A FOOD processing plan that even in a three weeks' trial measurably increases production, reduces glass breakage almost to the vanishing point, cuts maintenance to a minimum and fattens the employees' pay envelope without raising costs appreciably would seem to deserve serious consideration from the industry as a whole. The wage incentive plan here at the P. J. Ritter Co. can be credited with accomplishing these results during three weeks of operation on one production line.

The plan was conceived solely as a means of increasing production during the current labor shortage. The fact that it accomplishes so much more can be attributed to the more alert approach of employees to their job as a direct result of the one sure-fire morale builder — increased pay.

As a starting point in setting up the basis for a wage incentive plan, we had to decide upon a production line on which a normal production rate could be readily established in a minimum amount of time. This normal production rate forms the base on which additional pay for increased production is determined on a percentage basis. Of course, the ideal production line on which to establish a production rate is the one with the least number of variables. For this reason, a production line producing pork and beans packed in glass jars was chosen as the one for establishing the first production rate as the basis of our first incentive plan.

The War Production Board's approval is necessary before an incentive plan can be introduced. Sufficient data to establish a normal production rate and, correspondingly, the labor cost, over an adequate time period was necessary before the WPB would approve the introduction of an incentive plan. WPB then established the base production rate above which increased wages could be paid. WPB's viewpoint no doubt is to safeguard against any indiscriminate wage increases which might add to the final cost of a product and necessitate passing the increase on to the consumer. The average rate of production during the trial period was between 80 and 84 jars per minute. This was approximately 60 percent of the capping machine's maximum capacity of 140 jars per minute. WPB finally permitted an arbitrary base to be set at 80 jars per minute, above which a percentage bonus could be paid. The pay increase is in direct proportion to the increase in production, permitting employees to materially increase their income.



This scoreboard keeps the incentive plan workers informed as to the progress of the production line, hour by hour. Interest is thus maintained since, the employees can calculate each day's extra earnings.

Almost immediately after the plan was explained to the workers and put into effect, it became obvious that everyone on the production line —from the men supplying empty jars to, and including, the retort crew—must be given the benefits of the plan, if the system was to be productive. This required including inspectors on the washing line, meat cutters, the kitchen crew, rackers, labor on the filling and capping machines, and the retort crew. A delay anywhere along the line would hold up the whole line.

During the three weeks' run under the plan, the production rate reached and held at about 95 percent of the capping machine's capacity—a considerable increase over the 60 percent capacity before the plan was introduced. At that time, we were packing on the average 1,600 cases in 8 hours, or 200 cases per hour. Under the incentive plan, production was raised to 3,500 cases per 10 hours, or 350 cases per hour. Breakage of glass jars before the incentive plan was probably no different than in most other plants. At the end of the three weeks under the incentive plan, less than two cases per day were lost through breakage—approximately one jar in 1,750 jars packed. In one 4-hour run near the end of the three weeks' period, 16,000 jars were packed with only seven misses and not one jar broken.

Part of this increase in production can be attributed to better employee attendance and application during every minute of each hour's work. With the wage incentive plan came greater care on the part of each worker to see that the line kept moving steadily every minute of the time from the starting gong until the quiting signal. On one of the first mornings under the incentive plan, the crew feeding jars to the production line was ten minutes late getting started. The castigations heaped up-

on this crew by the other workers on the line was convincing in several languages. The following morning the jar feeders were 15 minutes ahead of time.

Another factor contributing to increased production was the almost complete elimination of production-line stops for maintenance. Previous to the introduction of the incentive plan, the line stopped at almost regular intervals for one repair or another, the operators standing around until the maintenance crew made the necessary repairs. Now when breakdowns occur—they are infrequent—the men on the production line make their own repairs rather than lose time while waiting for the maintenance crew to come and do the job. For the most part, however, repair requirements are prevented by greater care and preventive maintenance. Any delay for maintenance now is costly to every man on this production line.

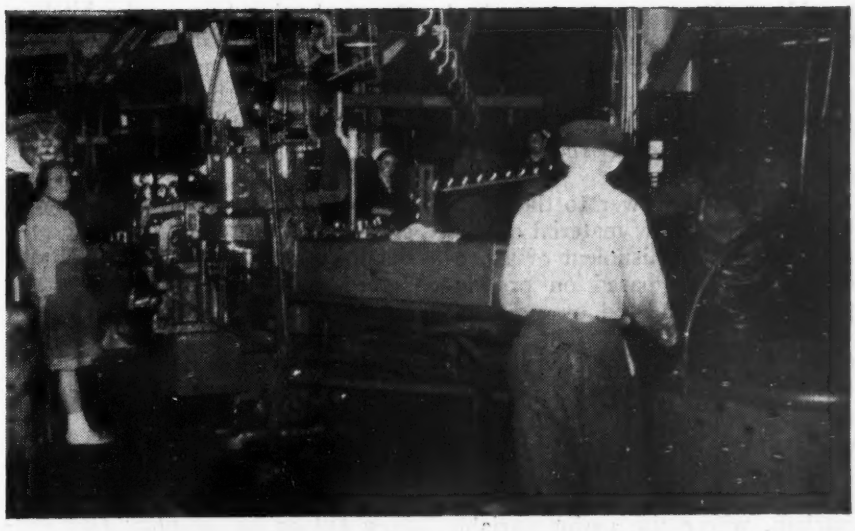
Breakage Greatly Reduced

For the same reason, breakage of glass containers has been cut to what even equipment manufacturers maintain is an unbelievably low figure. Being so low, the breakage can easily be checked by actual count, as well as by checking empty cases left over. All checks indicate that about one in 1,750 is the correct breakage figure. This certainly seems to indicate that breakage of glass containers is due almost entirely to employee carelessness and that such carelessness can be prevented.

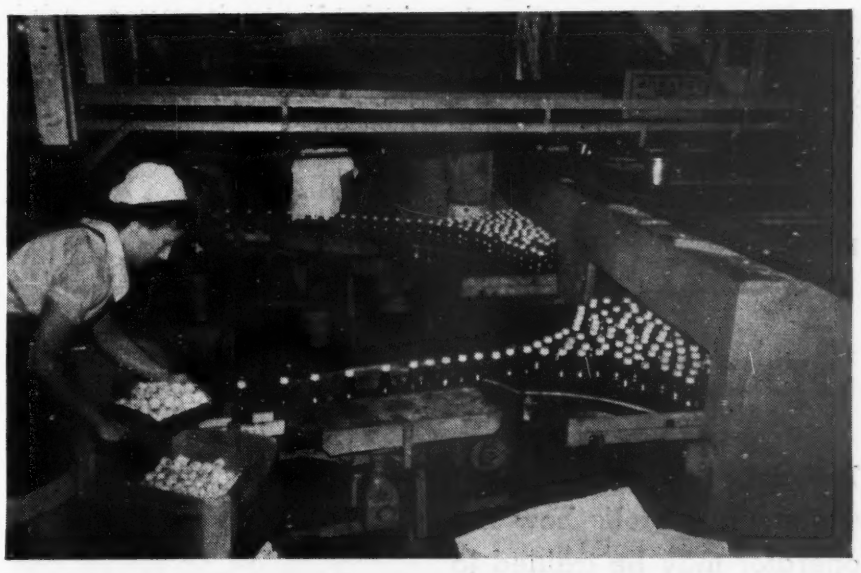
When this was written no exact calculation had been made on overall production costs. Based on the costs before the plan was instituted, however, the bonus paid would add less than 2 cents per case. This, of course, makes no allowance for the per-case reduction in such fixed costs as power, investment and general overhead, which would lower the estimated production cost per case.

Problems Involved

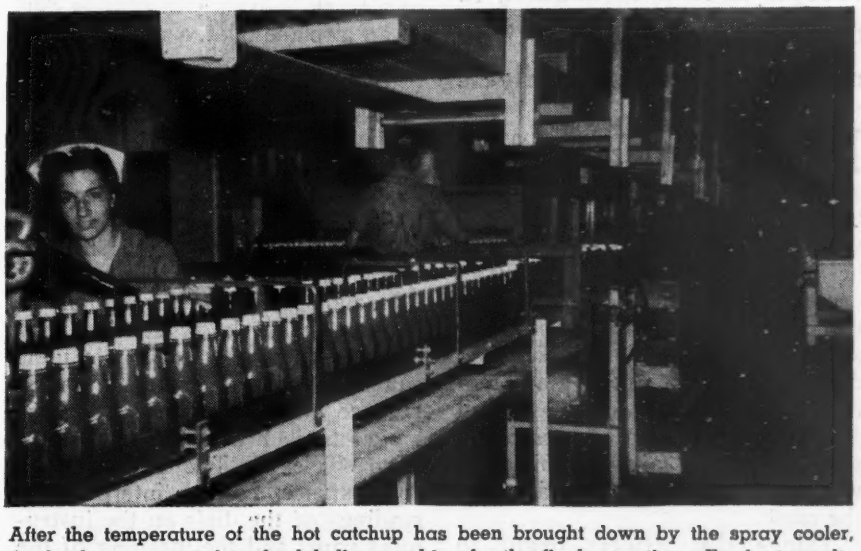
Setting up an incentive plan for a production line packing pork and beans in glass jars and getting such a plan into operation is a relatively simple job compared to the problems involved in formulating a similar plan for other production lines. The problems involved in formulating a wage plan for a production line increase with the number of variables encountered. Potatoes and asparagus, for example, offer numerous variables in raw materials, even from hour to hour, each of which



The capacity of the capping machine, shown in the rear, was the basic factor in establishing a fair production rate. In this picture, the packers in the foreground are filling a retort with beans packed in glass jars, on which breakage is negligible.



The catchup lines have been added recently to the incentive plan at the Ritter plant, subject to WPB approval. Here, the capped bottles of hot catchup are seen passing from the capper into the spray cooler.



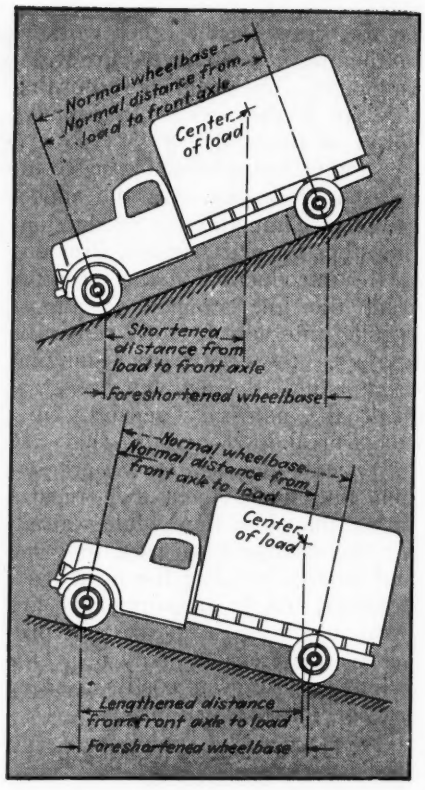
After the temperature of the hot catchup has been brought down by the spray cooler, the bottles are carried to the labeling machine for the final operation. For best results in setting up an incentive system, the whole production line must be included.

would require a separate standard of production to justly reflect the greater or lesser lengths of time required to process them. Similar problems arise with all fruits and vegetables and each requires individual study.

Possibly the answer to the problem of varying raw material quality rests in the establishment of a production "norm" based on production data accumulated over several years. The average obtained from this data might successfully be used to establish a base for the operation of an incentive plan, which would work out profitably to both processor and employee over a period of time. It should work for items such as catchup, where the major variable is the water content of the tomato, which of course varies according to the rainfall during the growing season. This might vary sufficiently within the season to adjust itself, and it surely should adjust itself from year to year. At any rate, the variable puts a load on only one part of the production line — the kitchen. Some adjustment in this part of the production line might sufficiently compensate for the variation in raw materials to make the results on the whole production line successful.

Whatever the other problems involved, it is absolutely necessary to establish accurate and complete production data on present operations before an incentive plan can be considered. Without such data, the processor is traveling in the dark in any attempt to set up a percentage bonus plan, based on increased production rate.

(Since this article was written, the tomato catchup line at Ritter's has been put on an incentive plan subject to the approval of WPB and at a base rate to be established. The plan is retroactive. Even though the catchup-line pay increases are nebulous pending the board's decision, the production rate has risen from 157 to 225 cases per hour.—The Editors).


Normal wheelbase
Normal distance from load to front axle
Center of load
Shortened distance from load to front axle
Foreshortened wheelbase
Normal wheelbase
Normal distance from front axle to load
Center of load
Lengthened distance from front axle to load
Foreshortened wheelbase

These sketches show how the actual loads on the front and rear axles vary as the truck ascends and descends a steep hill.

Train the Driver and Spare the Truck

The driver's manual, described here, tells how the operator may be trained to detect trouble before it develops, thus contributing to the all-important wartime maintenance of truck fleets

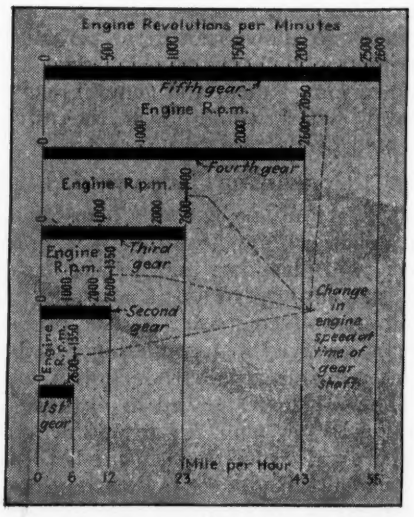
MUCH attention to wartime training of truck drivers should be given by food fleet operators. Under current conditions, the wheels of motor transportation can be kept rolling only through strict conservation of trucking equipment and the practical training of those serving as drivers. To this end food companies which operate automotive fleets would do well to establish an effective program for driver instruction in the care of vehicles as well as in their proper operation on the road.

Things that drivers ought to know are told in the driver's manual prepared by White Motor Co. This manual seeks first to build up the morale of the truck driver and to make him proud of his profession.

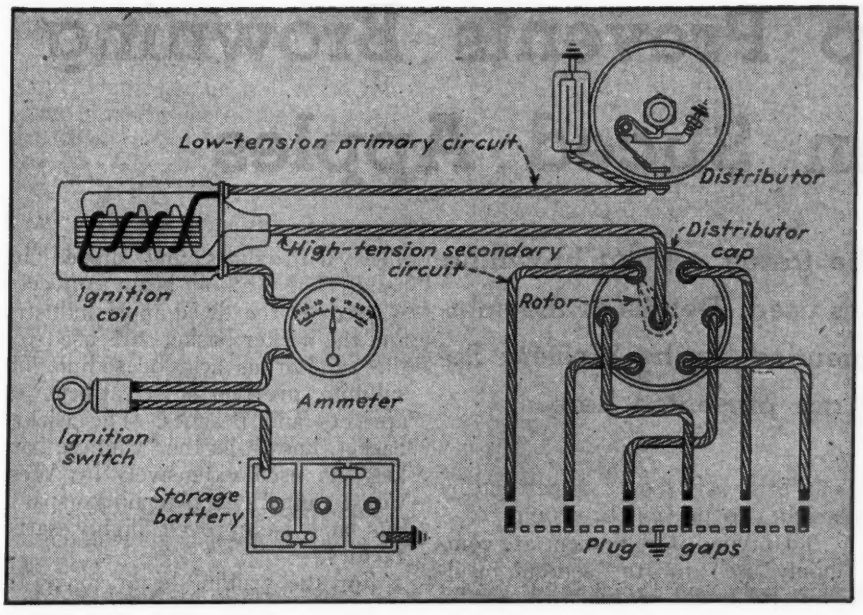
It is pointed out that in some respects the responsibility of the driver of a truck is even greater than that of an airplane pilot, a railroad engineer or the captain of a ship. The work of each of these is safeguarded by the precautions of science such as radio beams, automatic block signals and navigation aids. But once the truck driver leaves with his load, he is on his own.

But the principal aim is to present clearly and simply the information about a motor truck that all drivers should know so that they may be able to better handle their equipment and cooperate with maintenance men in order to secure longer truck life and greater operating efficiency. The driver is told, for instance, how to interpret the readings of the dials on the instrument panel and the meaning of the unusual chassis noises which indicate that mechanical troubles may be developing. The information is presented under six classifications: (1) Correct preparation, (2) correct starting, (3) correct taking off, (4) correct road practices, (5) correct parking, (6) correct care.

While at first thought, it might seem too elementary, even superfluous, to discuss correct preparation with trained truck drivers, it is surprising how many road failures, delays and accidents are due to laxity on the part of drivers to make



Relationship between engine and vehicle speeds for proper gearshifting.



Simple wiring diagram showing relationship of battery coil, distributor and the primary and high-tension ignition circuits.

certain that their trucks are in proper mechanical condition to complete safely their appointed trips. The wise driver always walks around his truck or tractor and trailer and looks over the equipment carefully before he climbs into the cab. Though it is usually the responsibility of the maintenance department to get the equipment in proper shape before the driver takes over, the latter should double-check the equipment for his own safety and to make certain it is capable of performing the work assigned. Matters which should receive the driver's attention before he takes over include proper tire inflation and the use of valve caps, tightness of steering connections, condition of springs, proper placing of the load, the oil, water and fuel supplies, and the working order of the brakes, clutch, windshield wiper and horn.

Checking tire inflation pressures once a week is not often enough. This should be done daily. With the present scarcity of large-size truck tires, daily checking of air pressures not only is desirable but necessary.

Correct starting covers the starting of the motor, the effect of engine temperatures, the reasons for high and low oil pressures, and indications of the brake air gage when the vehicle is equipped with air brakes.

For best results in taking off, the clutch slippage should be limited to from 1¼ to 1¾ seconds. While it may be possible to start a loaded vehicle in second gear, it is not good practice to do so when the clutch slippage exceeds the above time.

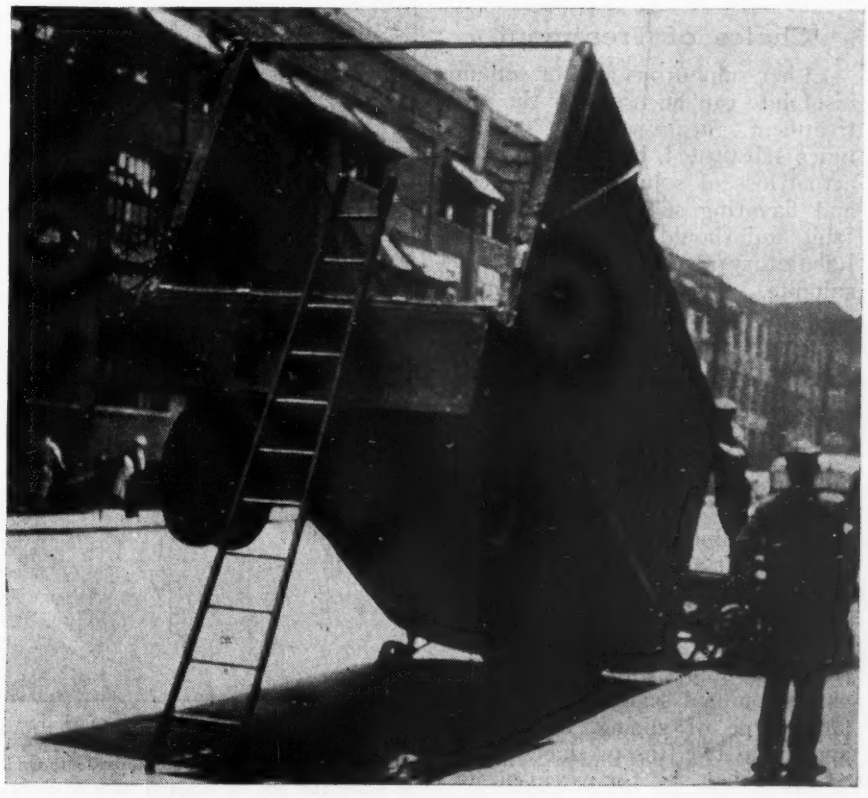
Allowing a heavily loaded truck or tractor-trailer to hit road bumps or chuckholes at high speed is an example of bad road practices. How to change gears without clashing, how to take curves, and the relationship of engine speed and vehicle speed are things the drivers should be told. Braking and brake equipment also should come in for considerable explanation, especially with tractor-trailer outfits, where skidding or jackknifing are particularly dangerous. Care of the engine cooling system and the use of antifreeze ought to be gone into very thoroughly. How to thaw a frozen radiator without cracking the cylinder block is very useful information.

Drivers should be told to leave the truck in gear and block the wheels when parking on any grade. On level ground, the hand brake should be applied in case the vacuum or air brakes are released through slow leaks in the lines.

Information on lubrication, air cleaners, oil filters, batteries, tires, fuel and air tanks and engine fuels may well be included in a driver training program.

The weights of various commodities, data on tire service loads and inflation pressures, and facts about antifreeze solutions and electrical accessory loads are information that truck drivers can use to the advantage of fleet operators.

All of the above, included in the White manual, ought to be part of the instructions to drivers.



This is what is known as a "trailer nose dive." It is likely to occur when a semi-trailer, disconnected from its tractor, has too heavy a load on its front end. This often is caused by unloading from the rear, leaving the forward portion out of balance.

Sulphur Dip Prevents Browning Of Frozen Sliced Apples

Sliced apples for pies can be frozen without browning when the right pretreatment is used. Details of the solutions and equipment recommended by the Western Regional Research Laboratory are presented here

APPLES frozen for pies amounted to 34 million pounds in 1943. This was more than double the 1942 production for the country as a whole. Most of the increase in production occurred in the western states, where only 1 million pounds was frozen in 1942 and nearly 20 million in 1943.

Because of this rapid expansion, there is need for specific information on processing details. The Western Regional Research Laboratory has issued an information sheet[1] based on its own laboratory studies covering preparation methods to prevent browning, particularly after the fruit has been thawed.

Choice of Treatment

Either sulphurous acid or sodium bisulphite can be used for the pretreatment. Steam scalding is sometimes substituted, but it leads to an actual loss of soluble sugars, acids and flavoring substances from the fruit and should be avoided. The Laboratory recommends sodium bisulphite, which gives an almost odorless solution. Sulphurous acid penetrates the apple pieces rapidly, but the odor is most objectionable.

Equipment Needed

The apples are first peeled, cored and sliced. Preparation can be carried out as a single operation on some machines, in which case the apple is left as a single spiral slice. More commonly, only the peeling, coring and trimming are done in one operation, and other equipment slices the apples either as rings or as longitudinal segments. With the latter type of slicing, cutting the apple into twelfths produces pieces of convenient size for use in pies.

If a delay is necessary at any point between peeling and dipping, the apples should be held in a weak salt brine (not over 1 percent by weight) to prevent browning.

Two types of equipment are commonly used for the sodium bisulphite treatment, a tank with a walking-beam conveyor that continuously removes the slices from the solution or wicker baskets that are filled with slices and dipped by hand. The walking-beam conveyor is used by the dried-apple industry and the wicker baskets are used for the sulphurous acid or sodium bisulphite prefreezing treatment of apricots and peaches. The wicker basket, known as the "Chinese basket," is used extensively by West Coast canners in blanching asparagus and has proved highly satisfactory.

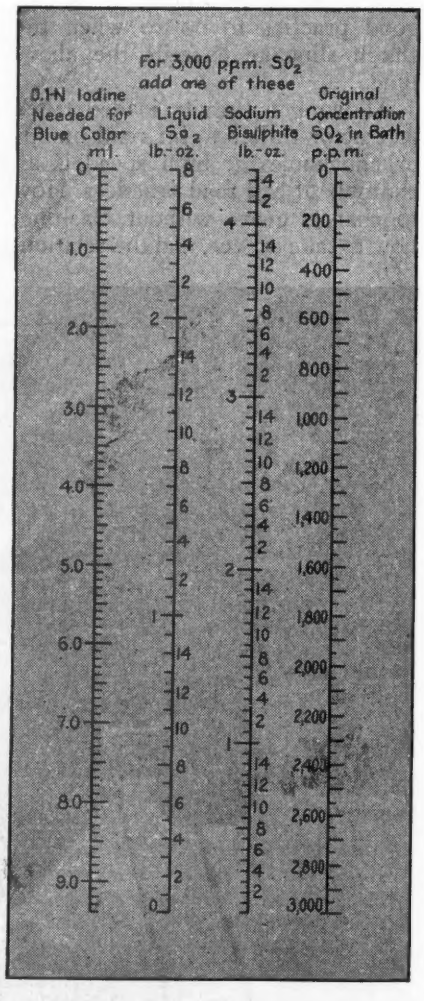

For 3,000 p.p.m. SO_2 add one of these
0.1N Iodine Needed for Blue Color ml.
Liquid SO_2 lb.-oz.
Sodium Bisulphite lb.-oz.
Original Concentration SO_2 in Bath p.p.m.

Chart for determining the amount of sodium bisulphite or liquid sulphur dioxide to add to each 100 gal. of dipping bath to maintain the necessary strength of solution. Note that the two central scales read up, while the two outside scales read down.

For the walking-beam conveyor, a nearly square tank is required. When wicker baskets are used, a long narrow wooden vat constructed of planks is suitable. Such a vat, built of 2x12-in. planks, two planks wide, two deep, and 11 ft. long, has a capacity of 2 or 3 tons an hour.

If the tank is equipped with a conveyor, the slices are dropped directly from the slicers into the tank or onto a conveyor belt that carries them to the tank. The baskets, however, are nearly filled with the slices and then immersed in the dipping bath.

The duration of the dip should be at least 1 minute, and the dipping solution should contain between 2,000 and 3,000 p.p.m. of SO_2. Little advantage was found for a 5-minute dip, in laboratory tests.

Freezing stops penetration of the SO_2, and it is not resumed quickly enough on defrosting to prevent browning in the areas not previously penetrated. With the apples and solution at 60 to 80 deg. F., and a bisulphite solution containing 2,000 p.p.m. of SO_2, it was found necessary to hold the slices 8 hours before freezing. Longer holding time is required if the temperature of fruit and solution is lower. Sulphurous acid will give a quicker penetration and the holding period is not required.

Both concentration and time are for apples sliced in twelfths. Larger slices will require a longer holding period, as well as a more concentrated bath. Slices should be as uniform as possible, so that penetration will be complete in all slices at about the same time.

After dipping, the slices are drained and packaged. Sugar need not be added unless desired by the

users. The addition of sugar does not aid in preserving the color of the fruit treated with bisulphite, and there is some indication that it may retard penetration.

Since the apple slices will tend to settle after they are packed, especially if they are hauled some distance before they are frozen, the packages should be rigid enough to support the weight required in stacking. They should also be tight enough to prevent excessive loss in weight through evaporation in storage.

Freezing and storage temperature should be maintained at 0 deg. F. or below.

Test for Penetration

Completeness of penetration can be determined by cutting a slice in two and putting a few drops of 1 percent catechol solution on the cut surfaces. Any "unsulphured" area will turn dark brown or black in a half hour or less. If there is any question about the effectiveness of the penetration, frequent tests should be made on the packaged fruit before it is put in the freezer.

The catechol solution is best made up fresh every few days, by dissolving 2½ level teaspoons of powdered catechol in a half pint of water. Catechol is produced by the manufacturers of organic chemicals and can be obtained from most chemical supply houses. Before using, the freshness of the solution can be tested on the cut surface of an untreated apple.

Preparing Dipping Bath

The dipping solution may be made by dissolving sodium bisulphite powder in water or by mixing definite proportions of liquid sulphur dioxide and caustic soda. In the latter case, care must be taken to check the composition of the bath, since if too much sodium hydroxide is used the sulphite, or a combination of the sulphite and hydroxide, will be obtained, instead of the bisulphite. Such a solution, being alkaline, will have a very undesirable effect on the fruit.

For the liquid SO_2, a copper tube is fastened to the bottom of the wood dipping tank, using copper nails. The tube projects sufficiently above the vat so that connection can be made with a cylinder of liquid SO_2. Below the water level the tube is perforated.

The dipping tank is filled to a depth of 12 to 14 in. with water, preferably at 60 to 80 deg. F. The weighed amount of caustic soda is dissolved in this, then the SO_2 is added at a rate which does not cause bubbles to rise to the surface. The SO_2 added may be weighed directly by setting the cylinder on a scale or it may be measured volumetrically. An iron tank can be equipped with a liquid level gage, calibrated in pounds of SO_2.

This picture has been prepared by the Western Regional Research Laboratory to show the simplicity of the equipment and the ease of manipulation in following their method for checking the strength of the bisulphite dipping bath.

For a bath containing approximately 1,000 p.p.m. of SO_2, 8 oz. of 95 to 100 percent caustic (ordinary household lye) and 13½ oz. of liquid SO_2 are required for every 100 gal. (13⅓ cu. ft.) of water. Commercial soda flakes contain only about 76 percent of sodium hydroxide, so the quantity of lye must be increased if these are used. For instance, for a bath containing 3,000 p.p.m. of SO_2, 2½ lb. of liquid SO_2 and 1½ lb. of 95 percent lye or 2 lb. commercial caustic flakes (76 percent) must be used per 100 gal.

Before testing, the solution must be thoroughly mixed. The bath must be acid to methyl red indicator. That is, when a few drops of a 1 percent solution of methyl red in alcohol are added to a little of the bath solution in a test tube or glass, a red color will be obtained. If the indicator turns yellow, the bath is alkaline, and SO_2 should be added until the red color is obtained on a test sample. Bromcresol green indicator can be used. With this a yellowish green to green color indicates the acid range, while a definite blue shows that the solution is too alkaline. The bromcresol green is used on a "spot plate," a drop of the indicator being placed on a clean porcelain surface and a drop or two of the test solution added.

If sodium bisulphite powder is used, the proportions are 23 oz. for 100 gal. of water to give 1,000 p.p.m., or 4 lb. 5 oz. for a 3,000 p.p.m. solution.

Maintaining SO_2 Concentration

Before putting the solution in use and several times during a day the strength of the dipping solution should be tested. The SO_2 in the bath will diminish with use and SO_2 or bisulphite powder must be added to bring it to the 2,000 or 3,000 p.p.m. range.

The Laboratory offers detailed instructions for titrating the bisulphite with iodine.

The following equipment, which can be obtained from chemical supply houses, is required:

One 25- or 50-ml. burette with suitable support.
One 10-ml. pipette.
Two 125-ml. Erlenmeyer flasks.
Iodine solution (0.1 normal).
Starch indicator, made by boiling potato starch (1 percent in water) until it becomes translucent.

Fill the clean dry burette, which is supported by a ring stand or wall bracket, with the iodine solution up to the zero mark. The tip of the burette below the stopcock must also be full, and can be filled by turning the stopcock and letting a little run through. Read and record the volume of iodine solution in the burette at the beginning of each test. The curved surface of the solution in the burette is called a meniscus; the reading is taken from the center of the meniscus, rather than from the sides. Now take a sample from the dipping bath in a clean dry glass or beaker. Suck a portion into the clean dry pipette to a level above the 10-ml. mark on the upper stem of the pipette and quickly cover the top of the pipette with the index finger. Then slightly loosen the finger while holding the pipette over the beaker until the center of the meniscus reaches the 10-ml. mark on the upper stem of the pipette and again increase the pressure of the finger to hold the solution at the mark. Now let the contents of the pipette drain into a clean 125-ml. Erlenmeyer flask and add approximately 50 ml. of water and a few drops of starch indicator.

Next add the iodine solution from the burette to the sample of bath solution in the flask until the latter solution changes to a permanent

(*Turn to page* 137)

Production and Characteristics Of Oil of Caraway

By ERNEST GUENTHER, Chief Research Chemist, Fritzsche Bros., Inc., New York, N. Y.

Botany, habitat, cultivation and harvesting of caraway seeds are described. Distillation of the oil, analysis and uses are explained. Possibilities for production in the United States are discussed pro and con

Courtesy Bureau of Plant Industry

The caraway plant.

CARAWAY seed possess a characteristic, aromatic odor and a warm, sweetish, spicy taste. For this reason, the dried seed is widely employed for flavoring bread, cakes, confectionery, cheeses, meat products, pickles and liqueurs of the kummel type. Odor and flavor of the seed are due to the essential oil which can be obtained by steam distillation.

Caraway *(Carum carvi* L.*)* is a perennial or biennial herb. During the second year it develops a slender stem bearing alternate, pinnate or bipinnate leaves with narrow, pointed terminal segments.

The inflorescence consists of a long-stalked compound umbel, with small white flowers appearing in May and June. The fruits, commercially called seeds, are oblong, laterally compressed, dark brown cremocarps which ripen in August during the second year of growth.

Habitat and Range

Carum carvi L. is a native of Europe and Asia, where it grows wild in meadows and pastures; it has also become naturalized in the North and Northwest sections of the United States. The fruit of wild caraway, though inferior in appearance, is said to yield more essential oil than that of the cultivated plant. Since available quantities of wild seed are not nearly sufficient for market demands, caraway is widely cultivated in many parts of the temperate zones, especially in Holland, Soviet Russia, Hungary, Poland, Denmark, Germany, Norway and lately also in the United States. Previous to World War II, Holland was the world's principal supplier of caraway seed and oil. Dutch caraway seed leads also in regard to quality, the African and Near East varieties having a somewhat inferior aroma. About 10 percent of Holland's total caraway seed production is used for distillation.

Caraway seed has become a speculative article, undergoing considerable price variations which depend upon the acreage planted, yield per acre, weather conditions, appearance of the seed and yield of oil. It is traded as a regular commodity on the Amsterdam produce exchange and other exchanges of the world's capitals, according to the so-called "Amsterdam conditions" which specify prime seed free from impurities and containing a certain percentage of essential oil.

Holland's Caraway Seed

The average yearly crop of Dutch caraway seed amounts to approximately 130,000 bags of 1 cwt. each (1 cwt. = 45.5 kilos). In years of abundant caraway production, such as 1924, 32 bags per hectare (13 bags per acre) was harvested, but as few as 16 (6.47 per acre) was harvested in years of abnormal weather conditions or when insect pests and ergot *(Secale cornutum)* did great damage, as in 1923 and 1927.

Years ago the Dutch farmers cultivated caraway without scientific principles, a high yield of seed per acre being considered of paramount importance. The harvest, however, was often considerably reduced by the caterpillar of the caraway moth *(Depressaria nervosa)*, by the presence of weeds (ergot) and, most of all, by seed shattering caused by premature double-splitting. Thanks to the work of R. J. Mansholt and that of K. Zijlstra[1] on plant selection, a caraway variety was developed possessing these advantages: (1) The seed ripens uniformly at about the same period. (2) The seed does not drop easily from the stalks, which permits harvest of the plant even on hot days and during noon hours. (3) The content of volatile oil is high and the oil is particularly rich in carvone.

The farmers sell their seed through grain merchants to local distillers or to exporters who supply the world's most important caraway users, viz., Germany, the United States, Great Britain, Czechoslovakia and France. Frequently, the prosperous and independent Dutch farmers prefer to hold their seed, sometimes for several years, until prices are sufficiently attractive. In the meantime, they grow other crops such as wheat, barley and peas, thereby causing considerable diminution of caraway production. This feature, together with weather conditions, insect pests and other factors makes the trade in caraway seed a very speculative one.

The essential oil content of Dutch caraway seed ranges from 3 to 6 percent and averages 4 percent. It is said that sunny, dry weather during the seed-maturing period diminishes the oil content, but the oil is then high in carvone and correspondingly low in terpenes. On the other hand, cool, damp weather in-

[1] Ber. Schimmel & Co., October, 1915, 20; 1927, 59.

creases the oil content, but the oil is low in carvone and other oxygenated compounds. This variation might be caused by the action of photochemical forces which transform terpenes into oxygenated compounds. It is also possible that during sunny, hot weather some of the volatile oil constituents, especially the terpenes, evaporate, whereby the content of the less volatile, oxygenated compounds increases.

Kofler[1] reported that the volatile oil content of caraway seed increases during storage, but Kofler's contention could not be confirmed by Biele[2] or by Sandermann[3]. Such an increase is only apparent and caused exclusively by evaporation of moisture and loss of weight during drying and storing of the seed.

Distillation of the Oil

To attain a good yield and a high quality of oil, well-matured seed must be employed. The seed is crushed between rotating cylinders and immediately charged into the still to avoid evaporation of oil. The stills should be equipped with perforated grids on which the crushed seed material is spread evenly to permit complete penetration by live steam. Distillation of one charge lasts from six to eight hours.

In the past, it was customary to distill the uncrushed seed, although the yield of oil is somewhat inferior to that from crushed seed. The exhausted seed was then dried and sold to the Far East for use in temple incense, or as an adulterant of regular seed. Exhausted seed can be identified under the microscope by its shriveled appearance and by the presence of ruptured cells on the surface.

Exhausted dried seed contains 20 to 23 percent of crude proteins and 14 to 16 percent of fat; thus, it may serve as an ingredient of animal feed.

The "National Formulary," Seventh Edition, specifies for oil of caraway seed:

Specific gravity at 25°C.	0.900 to 0.910
Optical rotation at 25°C.	+70°0′ to +80°0′
Refractive index at 20°C.	1.484 to 1.488
Carvone content (sodium sulphite method)	Not less than 50.0% by volume.
Solubility	Soluble in 8.0 vol. of 80% alcohol.

Genuine oils imported from Holland and Russia and analyzed in the laboratories of Fritzsche Brothers, Inc., had these properties:

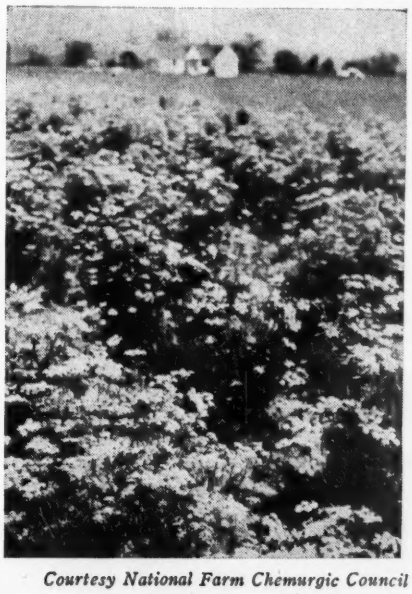
Specific gravity at 25°C.	0.904 to 0.909
Optical rotation at 25°C.	+74°20′ to +78°15′
Refractive index at 20°C.	1.4858 to 1.4879
Carvone content (neutral sulphite method)	50.5 to 56.0%
Solubility at 25°C.	Soluble in 2.0 to 4.0 vol. and more of 80% alcohol; exceptional oils soluble in 2.0 vol. and more of 70% alcohol.

When exposed to light and air for a certain length of time, oil of caraway seed, like carvone, assumes a yellowish tint. The oil becomes more viscous and the specific gravity increases.

Oils distilled in the French (Seillans, Var) and Clifton (New Jersey) factories of Fritzsche Brothers, Inc., had the following properties:

Specific gravity at 25°C.	0.905 to 0.911
Optical rotation at 25°C.	+74°10′ to +76°48′
Refractive index at 20°C.	1.4868 to 1.4878
Carvone content (neutral sulphite method)	53.0 to 59.0%
Solubility at 25°C.	Soluble in 1.5 to 3.0 vol. and more of 80% alcohol.

The specific gravity and the refractive index stand in direct relation to the carvone content, the optical rotation in inverse relation to the carvone content.



Courtesy National Farm Chemurgic Council

Caraway grown near Boise, Idaho.

Oil from Immature Seed

Sandermann[1] obtained from flowering plants an oil with these properties:

Specific gravity at 20°C.	0.863
Specific optical rotation	+78°0′
Content of carvone	7.0%
Content of limonene	About 75%

This oil contained azulene and cadinene in the fraction 130 to 135 deg. at 6 mm. pr. Cadinene, according to Sandermann, is not present in caraway seed oil; it occurs only in the stalks and leaves and amounts to about 50 percent of the oil distilled from those plant parts.

According to Sandermann, oil of caraway is formed in the seed quite some time before the harvest and does not undergo marked changes thereafter. This is especially true in regard to the carvone content, which reaches its maximum before full seed maturity.

Distilling green fruit, shortly after the flowering stage, Sander-

(*Turn to page* 118)

[1] Pharm. Ztg. 81 (1936), 931.
[2] Acta Pol. Pharm. No. 1, T. II. 1938.
[3] J. prakt. Chem. N. F. 151 (1938), 160.

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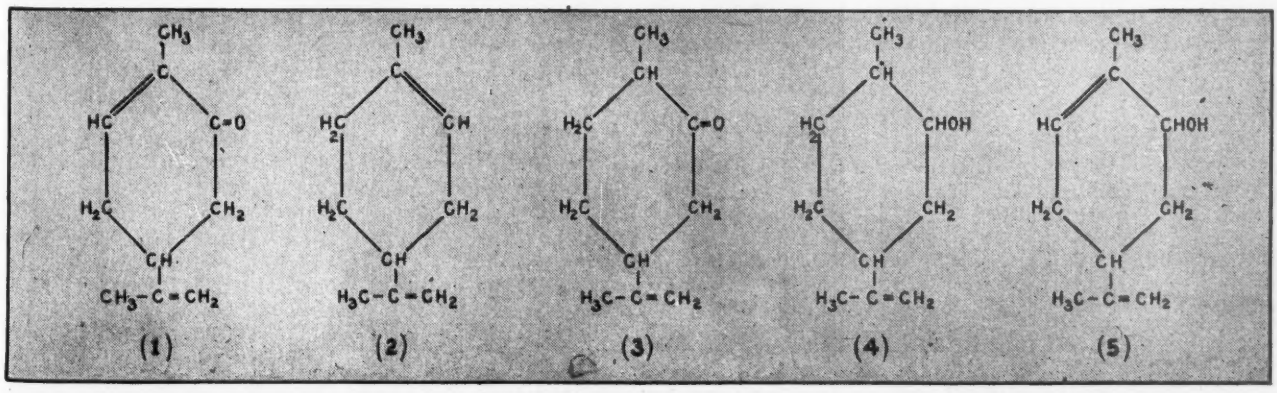


(1) Carvone, (2) d-limonene, (3) dihydrocarvene, (4) dihydrocarveol, (5) carveol.

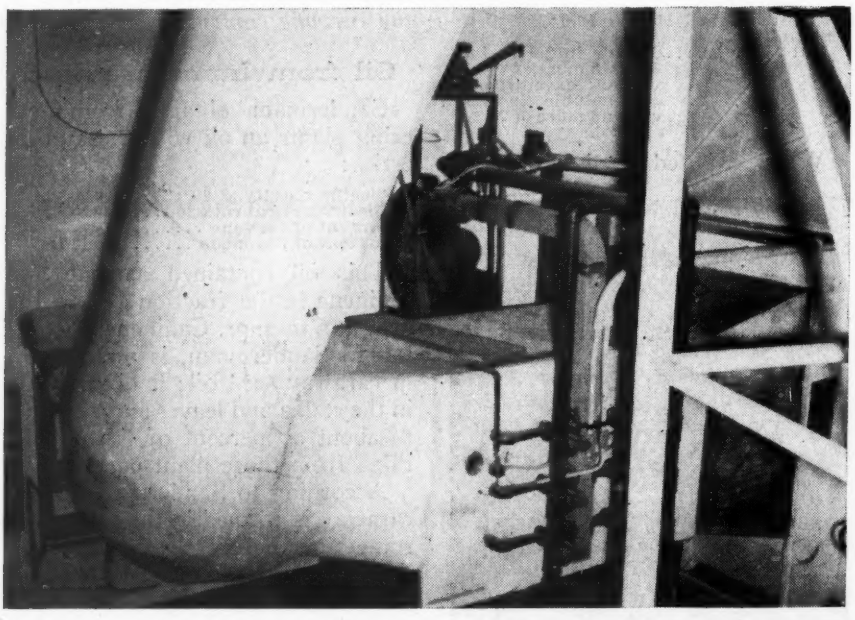
Spray Drying Lend-Lease Eggs

Details of processing practices, automatic regulation, sanitation and quality control, with facts about safety devices, tests and maintenance

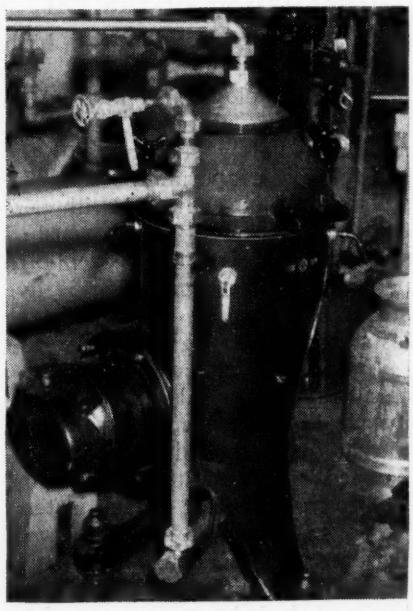
By RONALD H. CARR and GERHART SCHILD, Kress Products Corp., Chicago, Ill.

POSTWAR drying of whole eggs for general-purpose use is still indefinite, both as to the method and the volume of production. During the present war period, large-scale production has been principally for Lend-Lease use. Of the more than 100 plants producing powdered eggs for Lend-Lease, the plant of Kress Products Corp. is among those most highly mechanized. It operates under full instrumentation.

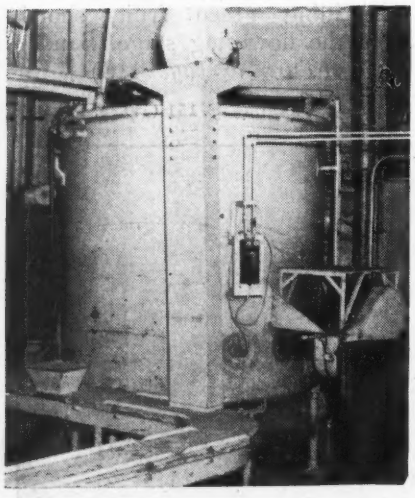
The accompanying tabular presentation gives the steps and the most significant practices followed in this particular plant, without going into the very voluminous detailed discussion which would be necessary to cover all drying systems and practices used throughout the egg drying industry. The flow diagram of the plant is schematic, but it does symbolize a typical plant for spray-drying eggs. The plate-type preheater is used only in plants producing egg powder to meet specifications of 2 percent moisture or less.



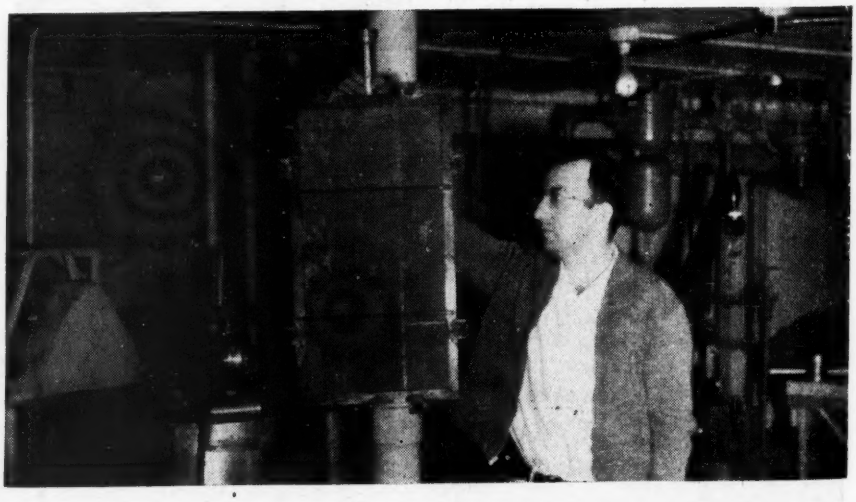
Air heater, showing air and oil feeds and temperature-control mechanism.



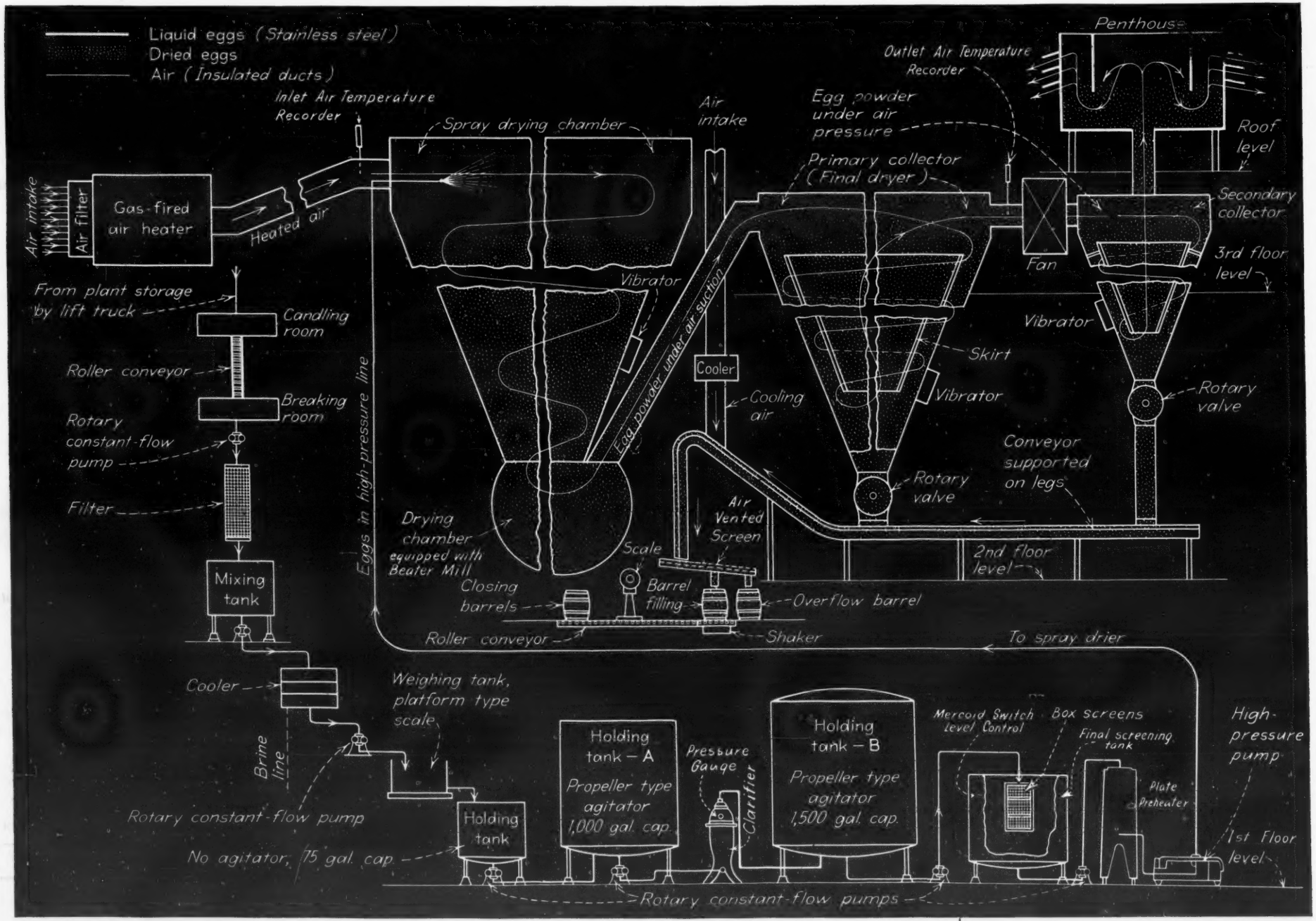
Centrifugal egg-meat clarifier.



Temperature control and recording instruments on holding tank "B" for liquid eggs.



Final screening tank for egg-meats. The picture shows the box filter removed for inspection.

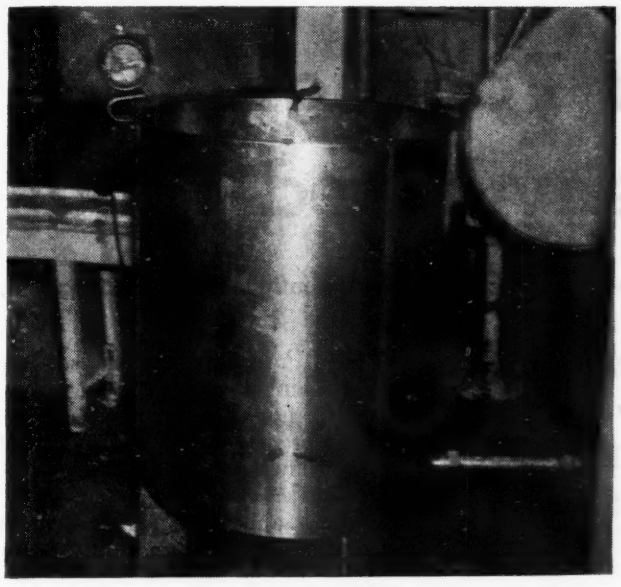

Liquid eggs (Stainless steel)
Dried eggs
Air (Insulated ducts)
Penthouse
Outlet Air Temperature Recorder
Inlet Air Temperature Recorder
Spray drying chamber
Air intake
Egg powder under air pressure
Primary collector (Final dryer)
Roof level
Secondary collector
3rd floor level
Air intake
Air filter
Gas-fired air heater
Heated air
Fan
From plant storage by lift truck
Candling room
Vibrator
Roller conveyor
Breaking room
Cooler
Skirt
Vibrator
Rotary valve
Cooling air
Egg powder under air suction
Rotary constant-flow pump
Filter
Conveyor supported on legs
Rotary valve
Air Vented Screen
Drying chamber equipped with Beater Mill
Eggs in high-pressure line
Scale
2nd floor level
Mixing tank
Closing barrels
Barrel filling
Overflow barrel
Roller conveyor
Shaker
To spray drier
Cooler
Weighing tank, platform type scale
Brine line
Holding tank — A
Propeller type agitator 1,000 gal. cap.
Pressure Gauge
Clarifier
Holding tank — B
Propeller type agitator 1,500 gal. cap.
Mercoid Switch Level Control
Box screens
Final screening tank
High-pressure pump
Plate Preheater
Rotary constant-flow pump
Holding tank
No agitator, 75 gal. cap.
1st Floor level
Rotary constant-flow pumps

PLANT PRACTICES, CONTROL PROCEDURES AND MAINTENANCE

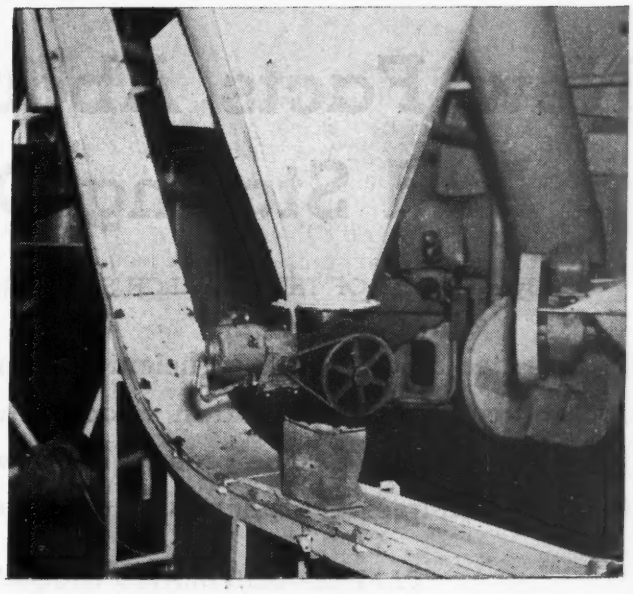
Station	Specific Data	Instruments Used	Procedure	Sanitation	Laboratory Control	Miscellaneous
Egg-storage in breaking plant	Room temperature: 35-40 deg. F. Room relative humidity: 40%-50%	Thermometer (preferably recording). Hygrometer.	Store eggs long enough to lower temperature of fresh eggs to at least 60 deg. F.	Storage rooms required to be in area free from strong odors and dusty and smoke-laden air and must be clean, dry and well ventilated. Special care must be taken to keep floors, walls and ceilings free from condensation. Wash down with odorless fungicide to avoid mold and bacteria growth. Inspect cases for leakers.		
Candling	Average experienced girl can candle 900 doz. eggs per 8-hour day. Room must be kept dry to avoid condensation on eggs.		Every egg must be candled in a darkened room before breaking. Sort to remove spoiled eggs, checks, leakers and dirties.	Buildings and premises required to be free from refuse, rubbish and waste materials that will encourage presence of flies, insects, rodents and vermin. Windows and outside doors required to be screened; all doors to processing rooms to close automatically. Cases and fillers must be removed as emptied.		
Breaking	Average experienced girl can break 750 doz. eggs per 8-hour day. Best breaking temperature for eggs: around 54 deg. F. Eggs should be cooled to at least 45 deg. F. within 30 min. after breaking.	Room thermometer. Thermometer in receiving tank (recording preferred).	Not more than three eggs per cup should be broken at one time. Cups and trays which have been in contact with spoiled or musty eggs must be exchanged for clean, sterilized equipment. The operator must wash hands before resuming work. Every cup of eggs must be smelled before being emptied into container with other egg liquid. Before going into receiving tank egg-meat should pass a screen to take out large pieces of shell and to break up the yolks. Shells should be removed either continuously by conveyor or in special cans. Cans must be emptied frequently and washed and sterilized once a day. All shells should be removed at least once a day. If frozen eggs are used, mixing in suitable proportion with fresh eggs is an advantage.	Cleanliness and good housekeeping are essential. Personnel must wear clean uniforms and wash hands frequently. Egg pails must be washed and sterilized often. Spoiled eggs must be removed at regular intervals. Girls must not wear perfume or nail polish. They should have hair nets, should wear spotless uniforms and wash hands each time they enter breaking room (breaking room required to have ample facilities for washing hands). Egg-breaking equipment required to be washed and sterilized in a separate adjoining room. It should never be stacked. Instead, should be inverted to assure draining. All equipment should be made from stainless steel or from material with sanitary surface. Frequent inspection is necessary for presence of dents, broken seams and chippings. Everything, including floors and walls, should be washed and sterilized at the end of each shift. Floors should be scraped free from fat and scrubbed. Air should be filtered, clean, odorless and of gentle circulation. Breaking room should be well lighted. Dressing and rest rooms should be kept clean, and well ventilated. Showers should be available. Workers on the premises have to pass medical examination to show proof that they are free of contagious diseases.	Strength of equipment and plant sterilizing solution should be tested frequently. (Minimum of available chlorine 100 p.p.m.) Check bacteria count on equipment periodically.	Dirty eggs can be used after washing, bactericidal rinsing and drying. Containers for spoiled eggs should never be used for regular operations.
Defrosting frozen eggs	Each container must be checked for condition and odor. Temperature in defrosting room must be below 45 deg. F. Defrosting room must be clean, well ventilated and odorless.	Thermometer.	Frozen eggs when received from the cold storage warehouse are frozen solid. They are placed in a defrosting room having a temperature of 45 deg. F. or less. The containers must be spaced far enough apart to allow for air to circulate freely around each individual container. Large fans blow air against the containers only long enough to loosen core from the sides of the can wall (about 12 hours). Each container is then opened, checked for condition and odor and emptied into a sanitary-type ice crusher. The frozen eggs, now thoroughly macerated, flow into a large vat and are mixed with the fresh eggs in the proper proportion.	Crusher and other equipment must be disassembled at the end of each shift, washed, flushed and rinsed with a suitable, odorless bactericidal solution. Floors and work tables must be kept clean. A rubber squeegee is satisfactory to remove final portions of liquid egg from containers. Do not pour water from one container into another to salvage residue. Emptied can must not be stacked on top of another while awaiting final cleansing of liquid eggs.	Frequent checks are essential on: (1) General condition of frozen eggs. (2) Total solids content. (3) Bacterial content. Bacteria counts should be taken from time to time on all equipment.	

Liquid eggs between breaking room and drying plant	Temperature of eggs not above 45 deg. F.	Pilot light in drying plant indicates pumping of eggs into holding tank "A". Automatic temperature control of cooling coil to hold egg temperature constant. Thermometer (recording preferred) in cooling coil outlet. Emergency safety switch in drying plant to cut off transfer of eggs.	Mixing while going through centrifugal and positive-feed rotary pumps. Pumping through cooling coils to lower temperature. Adjust pumping speed to give continuous flow and prevent stagnation of eggs in pipelines.	Pumps, valves and pipelines must be of sanitary type and disassembled daily and thoroughly scrubbed and rinsed. Before start of operation, run sterilizing solution through the whole system.	Check strength of sterilizing solution. Check bacteria count in pipelines, fittings, valves and pumps.	After start of operation, check system for leakage.
Holding tank "A"	Capacity sufficient for drying needs between breaking shifts. Temperature of egg-meat: 38-42 deg. F.	Liquid-level indicator. Recording thermometer for egg-temperature control. Automatic control of cooling medium for egg temperature desired.	Quantity of liquid eggs in tank at least sufficient for one complete run of clarifier. Liquid enters at bottom to avoid excessive foaming. Egg-meat in tank must be agitated slowly and continuously, either by propeller agitators or by circulating pump. Level of liquid should be above agitator.	Tank must be washed thoroughly when empty. Shell fragments which have settled on the bottom must be removed. Before reuse, tank must be sprayed with sterilizing solution. Do not wash foam into liquid eggs; it would increase bacteria count.	Bacteria count of foam (after 3 hours, likely to be 850,000 per g.).	Holding tank built from or lined with sanitary material. Tank must be refrigerated and have means for agitation.
Clarification of egg-meat		Pressure gage in inlet line to indicate indirectly performance of clarifier.	Liquid eggs are pumped from holding tank "A" through clarifier of dairy separator type into holding tank "B". Clarifier removes shell particles, chalazea, membranes and other undesirable solids. Clarifier should be vented at each start to eliminate trapped air and cleaned after each run.	Clarifier must be disassembled and washed after operating for about 1 hour or after passage of about 6,000 lb. of fresh egg-meats. Correct assembly is very important.		Clarifier insures less wear on high-pressure equipment and reduces clogging of nozzles.
Holding tank "B"	(See holding tank "A")	(See holding tank "A")	This tank insures continuous flow of clarified egg-meat and operation of dryer at night. (See holding tank "A", paragraphs 2 and 3)	(See holding tank "A")	(See holding tank "A")	(See holding tank "A")
Final screening tank	Temperature of egg-meat not above 45 deg. F.	Automatic float control keeps screens always submerged.	Final screening through multiple layer of sanitary mesh equivalent to approximately 50 mesh as a check control on effective operation of clarifier. Tank provides emergency egg supply.	Screens must be disassembled, cleaned and sterilized after daily shutdown for those of special design. Others, particularly dairy types, should be in duplicate to permit alternate cleaning every 1 or 2 hours. Tank must be washed and sterilized.		Screens should be of stainless steel. Tank should be of stainless steel or other sanitary material.
Preheating	Sanitary, dairy-type plate heater, continuous flow.	Bulb-type indicating thermometer (recording preferred). Automatic control.	Egg-meats heated to 135-145 deg. F.	Constructed to permit easy disassembly for thorough cleaning and sterilizing.		Use optional. Not necessary for the production of powder with 5% moisture content.
High-pressure pump	Average pressure to be used not above 75% of maximum pressure of pump.	Visual manometer to adjust pressure. Recording manometer for control.	Single-stage pump pressure dependent upon drying system, number and size of nozzles, capacity of dryer and arrangement of high-pressure piping. Overflow returns excessive capacity of pump into final screening tank. Vent pump after each start to eliminate air in lines. Operation should be surge-free. Should be no leakage around pistons or valves.	Pump must be of sanitary construction and taken apart after each shutdown. All parts must be cleaned. Before starting, sterilizing solution should be circulated through the pump.		After assembly, pump should be tested with water for proper performance. Replace washers and gaskets if worn. Observe that cooling water for pistons runs during operation.
High-prsesure line and nozzles	Texture of powder depends mostly on pressure and type of nozzle and drying system used.		Egg-meat is pumped through high-pressure lines to nozzles. Pressure lines should be checked for leaks when testing with water before start of operation. It is helpful if spraying characteristics of nozzles can be observed through windows during operation.	Chlorine type or an odorless type of bactericidal solution should be pumped through the entire high-pressure system before start of operation. After each shutdown, lines, fittings and nozzles should be taken apart and cleaned.		If nozzles in a multiple nozzle system have to be changed during operation, adjustment in quantity of spray should be made. This can be done either by lowering the inlet temperature or by increasing the pressure. High-pressure lines, fittings and nozzles should be made from stainless steel. It is advisable to replace nozzles though only partly worn.

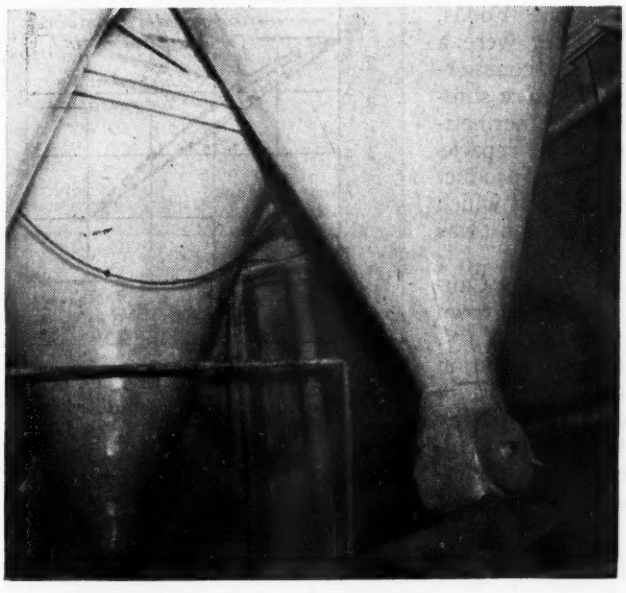
Station	Specific Data	Instruments Used	Procedure	Sanitation	Laboratory Control	Miscellaneous
Dryer	Spray type, constructed to permit continuous removal of egg powder. Inner surface coated with heat-resistant, nonchipping, high-finish lacquer or be of stainless steel.	Humidity and temperature should be measured at air inlet with wet-dry-bulb thermometer (preferably recording). Temperature of the hot air leaving heating chamber is governed by an automatic control (preferably visual and recording). This automatic control can be set for air temperatures between 250 and 400 deg. F. and should keep temperature variations within 5 deg. F.		Bag collectors, if used, required to be laundered or dry cleaned not less than once each month.		
Air flow	Air temperature in inlet of dryer: 300-400 deg. F. Air temperature in outlet of primary collector not to be above 160 deg. F. Air quantity sufficient to keep well below saturation point.	If direct gas heating is used, the gas and air should be premixed to insure a proper constant ratio and be fed under pressure to the burners. Quantity of this mixture is controlled automatically. Recording thermometer shows the temperature at the air outlet of the primary collector (charts should show 2-deg. variations). Outlet-air temperature is required not to exceed 160 deg. F.	Air must be filtered before entering system. Air is drawn through heating chamber, dryer, primary collector and blower and exhausted through secondary collectors and penthouse. Air volume, rate of flow and temperature depends on size and make of dryer. Outlet temperature depends on inlet temperature, quantity sprayed for a given system and desired moisture content for final product.	Air ducts between filters and dryer inlet should be cleaned twice a year.	If direct gas heating is used, air should be checked for unburned gases; burner should be fitted with device to insure correct mixture of air and gas to give complete combustion. Unburned gas will be absorbed by the dried egg.	Filters should be cleaned to prevent decrease in quantity of air. Frequency of cleaning depends on rate of dust accumulation. Ducts should be checked for air leaks. Economical operation requires sufficient insulation of ducts, drying chamber and cyclones.
Powder flow	Egg powder should not be above 85 deg. F. when packed. The powder should be stored in warehouse at 50 deg. F. or lower not later than 24 hours after packing. MAINTENANCE: The plant should have a maintenance man, familiar with all equipment and able to prevent total shutdown during operation. His duties are: (1) Regular greasing and oiling of all equipment. (2) Maintenance of high-pressure pump (reseating of valves, control of oil temperature and oil level, changing oil and renewal of gaskets). (Frozen eggs require more frequent reseating of valves). (3) Check regularly all equipment. All instruments and scales should be under the supervision of the laboratory and be recalibrated monthly.	Vibrators mounted on dryer and collectors are operated by an automatic timing device in a predetermined cycle to keep powder from adhering to surfaces of the system. SAFETY DEVICES: Should the following failures occur, burners will shut off automatically, alarm signal will sound and pilot lights will indicate source of failure: (1) gas supply, (2) gas-pressure drops of 10% below normal, (3) main blower, (4) premix blower, (5) electric current. Electronic safety device prevents restart of system before cause of failure is eliminated. A time delay assures that no unburned gases are left in the system, and the heater cannot be started without the main blower in operation. Failure of blower or heater shuts off high-pressure pump also. Failure of high-pressure pump during run shuts off heater and sounds alarm signal.	Egg-meat is sprayed through nozzles into the drying chamber at pressures ranging from 1,500 to 3,000 lb. per sq. in. or above, depending on size of nozzles and production requirements. Liquid is sprayed into the swirling hot air and powder is formed instantly. Powder falls into the final dryer, which breaks up lumps and keeps powder suspended in air. From there, the powder is drawn into primary collector where approximately 97% of the powder is separated from the air by the cyclonic action of the collector. The remainder of the powder is carried by the air through the blower into the secondary collectors, where approximately 2-3% is taken out. Remainder is taken out in penthouse before exhausting air into the open. Powder from primary and secondary collectors falls through rotary valves into conveyor system, which blends the powder and carries it to the screen. 55-deg. F. air is blown into the conveyor and screen to lower temperature of powder below 85 deg. F. From the sifter, powder at 85 deg. F. falls into barrel. The barrel is vibrated during filling period to insure capacity packing. Before closing, barrels are weighed and marked according to government specifications.	Dry sweep-down of entire system after each shutdown. Complete wash-down and sterilizing at least once a week. Starting with a dry system is important. Therefore, the dryer should be operated for 20 to 30 minutes without spraying in of egg-meats. This practice will insure dry walls throughout.	Sampling and laboratory control according to government specifications. Close cooperation between the laboratory and the production department is important. Frequent checks by the laboratory of all factors determining the quality of the powder assures economic operation and a minimum of waste. RECOMMENDED TESTS: Liquid eggs (daily composite sample): 1. Bacteria count 2. Total solids 3. Palatability Dry powder (routine samples throughout the run): 1. Moisture 2. Density Daily composite sample: 1. Moisture 2. Density 3. Fat 4. Color 5. Solubility 6. Palatability 7. Bacteria count	Sweeping down drying chamber several times during the continuous run, to prevent scorching of powder, is recommended.



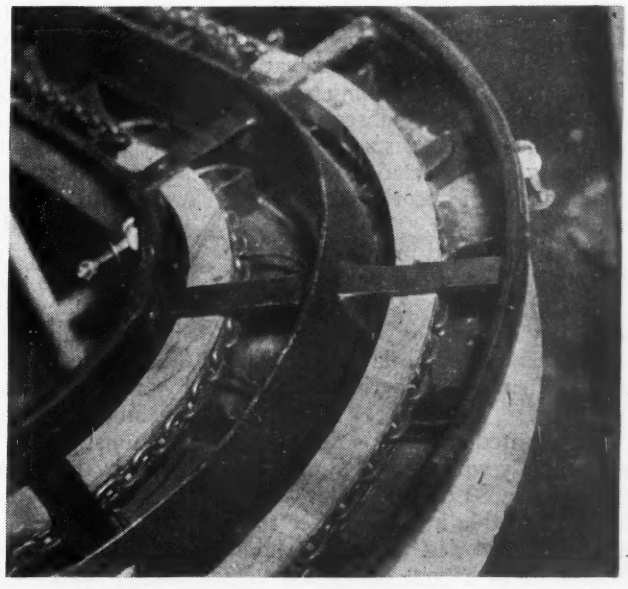
Final screening tank with liquid-level control.



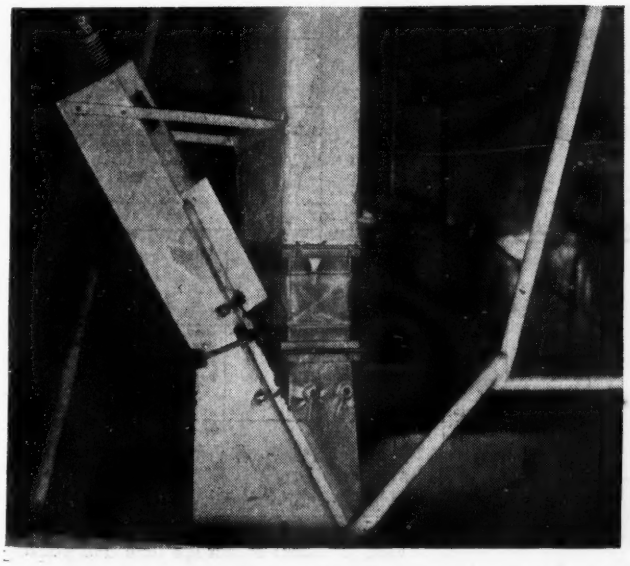
Bottom of primary collector used as final dryer.



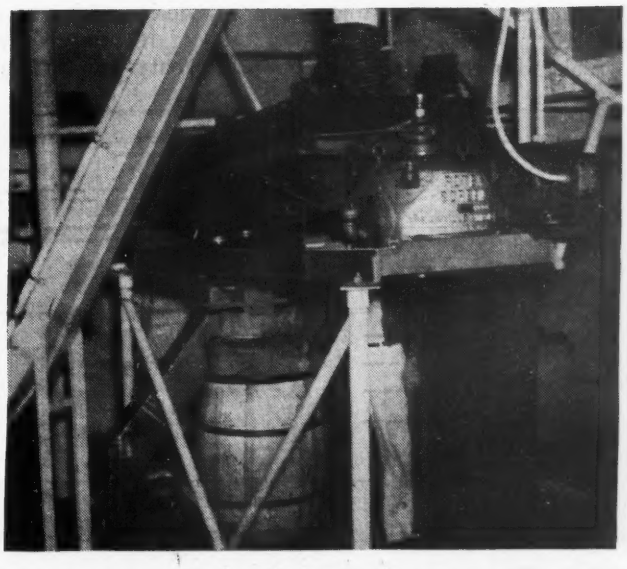
Bottoms of secondary collectors in Kress plant.



Uncovered section of egg powder conveyor.



Tension spring on upper end of elevator conveyor.



Rotex screen and upper leg of conveyor from collector.

New Facts About Packaging And Storing Dehydrated Foods

By MEMBERS OF THE RESEARCH STAFF, Research Laboratories, Continental Can Co., Chicago, Ill.

Dehydrated onions retain sufficient pungency to be satisfactory as a seasoning and in salads. They are a good source of vitamin C. The product keeps well for a year in an oxygen-free atmosphere at 80 deg. F. or less

PART IX—DEHYDRATED ONIONS

DEHYDRATED ONIONS are an entirely acceptable food product when prepared for eating. They retain sufficient pungency after dehydration and on subsequent storage to be used satisfactorily as a seasoning and in salads. They are a good source of ascorbic acid (vitamin C).

When packaged in an atmosphere essentially free of oxygen and stored at a temperature of 80 deg. F. or less, they retain the greater portion of the onion's initial flavor and vitamin content for a period of about one year.

Dehydrated onions deteriorate very rapidly when stored at temperatures above 80 deg. F. They are no longer passable in flavor after three months at 98 deg. F. They should be stored in a cool place and kept away from a source of heat.

These conclusions are based on the results of examinations through one year's storage.

Flakes for this experimental pack were supplied by Ivanhoe Foods, Inc., Auburn, N. Y. They were a part of the March 23, 1943, commercial run at this plant and were shipped to us in 5-gal. square, hermetically sealed containers. The repackaging and storage of the product was completed on April 1, at which time the initial examination was made.

The onions used were of the Canastota Yellow Globe variety, grown in the vicinity of Canastota, N. Y. They were prepared for dehydration by topping and butting by hand, washing in hot water to remove dirt and most of the skin and then trimming by hand to remove skin remnants and all bruised or discolored sections.

Following these operations, the onions with core included were sliced and tray loaded. They were dehydrated in a tunnel of the Eidt design. An entering air temperature of 165 deg. F. was used in the primary section and a temperature of 130 deg. F. in the secondary section. No finishing bins were being used, as the onions were dehydrated to 4 percent moisture in the tunnel itself. The total drying time was 12 hours.

Flavor and reconstitution tests were made on the uncooked flakes

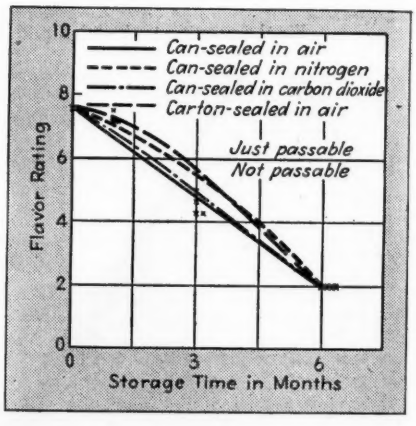


FIG. 2. Effect of storage time and packaging on flavor rating of dehydrated onions stored at 98 deg. F.

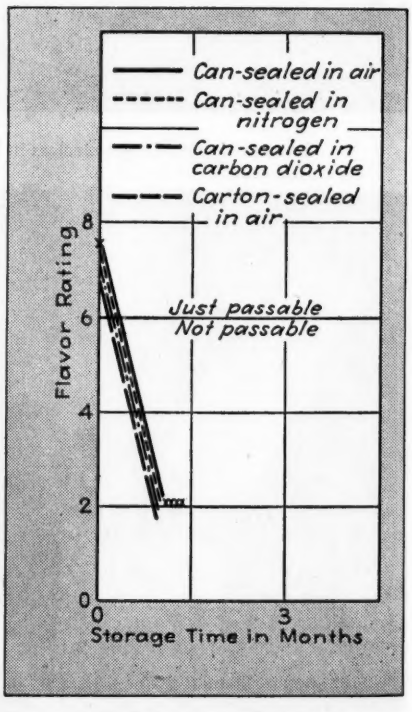


FIG. 3. Effect of storage time and packaging on flavor rating of dehydrated onions stored at 130 deg. F.

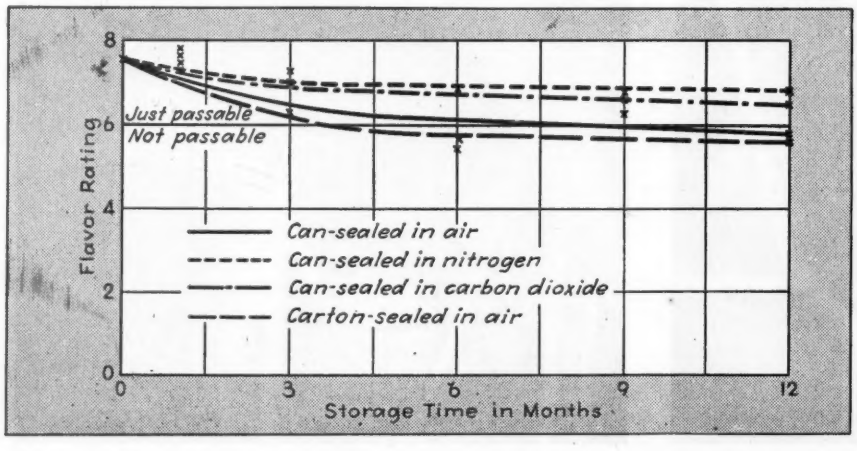


FIG. 1. Effect of storage time and packaging on flavor rating of dehydrated onions stored at 75 to 80 deg. F.

prepared by soaking 10 g. of them in 100 c.c. of distilled water for one hour.

Examinations of samples stored at 130 deg. F. were discontinued after three months because the product had deteriorated so much at that time.

Summary of Results

1. Effect of Packaging—In general, the gas-packed flakes were slightly superior to the air-packed ones with respect to both flavor and ascorbic acid retention. This was particularly true of those stored at room temperature. There was no difference in these respects between the flakes packed in nitrogen and those in CO_2. Those packed in the paper containers absorbed considerable moisture when stored at 98 deg. F. and 93 percent relative humidity. This absorption resulted in acceler-

TABLE I—Results of Examinations of Dehydrated Onions Stored at 75 to 80 Deg. F. (Room Temperature).

Storage time	Package	Flavor rating	Drained weight (grams)	Color (dry product) %N-1 (black)	%5YR6/12 (orange)	%5Y9/14 (yellow)	%N-9.5 (white)	Ascorbic acid content (mg./100 gm.) Reduced	Total	Gas analyses %O_2	%CO_2
				Moisture content of product—3.5 percent							
Initial examination	Can—air	...	..	..	..	..	..	..	..	....	....
	Can—N_2	7.6	56	45	10	34	11	53	83	0.4	0.2
	Can—CO_2	7.6	57	45	13	31	11	..	..	0.6	97.7
	Carton	...	..	..	..	..	..	..	..	....	....
1 month	Can—air	7.3	..	46	15	27	12	39	65	....	....
	Can—N_2	7.8	..	46	15	27	12	43	66	....	....
	Can—CO_2	7.7	..	50	12	30	8	48	69	....	....
	Carton	7.5	..	50	12	30	8	45	68	....	....
3 months	Can—air	7.3	52	36	18	30	16	29	63	....	....
	Can—N_2	7.0	61	35	22	25	18	33	65	....	....
	Can—CO_2	6.8	55	38	17	30	15	35	68	....	....
	Carton	6.3	56	40	23	25	12	25	65	....	....
6 months	Can—air	5.5	..	30	29	25	16	28	46	16.3	3.2
	Can—N_2	6.8	..	30	30	23	17	41	56	0.2	3.4
	Can—CO_2	7.2	..	34	28	23	15	50	68	0.3	98.6
	Carton	5.7	..	33	30	23	14	31	57	....	....
9 months	Can—air	6.6	57	25	31	30	14	29	49	....	....
	Can—N_2	6.8	59	25	31	30	14	34	59	0.6	3.6
	Can—CO_2	6.6	60	14	31	30	25	34	58	0.2	98.4
	Carton	6.3	56	21	32	32	15	41	53	....	....
12 months	Can—air	5.8	57	28	37	35	..	26	30	18.3	3.7
	Can—N_2	6.8	59	..	34	38	28	34	44	0.9	3.2
	Can—CO_2	6.5	59	15	33	38	14	32	44	0.9	98.2
	Carton	5.6	55	31	34	24	11	31	35	....	....

Odor tests made at the twelfth-month examination indicated that the gas-packed samples had a slightly more pungent odor. Also, samples showed a trace of a burnt or caramelized odor which was not noticed at the initial examination.

TABLE II—Results of Examinations of Dehydrated Onions Stored at 98 Deg. F.

Storage time	Package	Flavor rating	Drained weight (grams)	Color (dry product) %N-1 (black)	%5YR6/12 (orange)	%5Y9/14 (yellow)	%N-9.5 (white)	Ascorbic acid content (mg./100 gm.) Reduced	Total	Gas analyses %O_2	%CO_2
				Moisture content of product—3.5 percent							
Initial examination	Can—air	...	..	..	..	..	..	..	..	....	....
	Can—N_2	7.6	56	45	10	34	11	53	83	0.4	0.2
	Can—CO_2	7.6	57	45	13	31	11	..	..	0.6	97.7
	Carton	...	..	..	..	..	..	..	..	....	....
1 month	Can—air	7.2	..	44	23	22	11	35	51	19.4	3.0
	Can—N_2	7.2	..	42	24	23	11	41	57	1.6	2.9
	Can—CO_2	7.3	..	41	20	30	9	46	63	1.5	86.0
	Carton	7.5	..	41	23	27	9	35	48	....	....
3 months	Can—air	4.3	55	51	29	13	7	25	45	16.3	8.4
	Can—N_2	5.0	55	46	39	10	5	33	52	0.9	8.5
	Can—CO_2	4.7	53	49	37	10	4	34	55	0.2	98.4
	Carton	4.7	52	49	40	7	4	23	57	....	....
6 months	Can—air	Inedible	..	55	34	7	4	43*	..*	11.7	14.5
	Can—N_2	Inedible	..	58	35	4	3	55*	75*	0.3	12.9
	Can—CO_2	Inedible	..	58	36	2	4	39*	48*	0.3	97.5
	Carton	Inedible	..	71	27	..	2	30*	50*	....	....
9 months	Can—air	Inedible	54	49	40	7	4	46*	67*	5.4	21.5
	Can—N_2	Inedible	54	53	40	3	4	55*	89*	0.3	17.4
	Can—CO_2	Inedible	54	61	36	2	1	53*	91*	0.1	96.6
	Carton	Inedible	56	68	31	..	1	52*	73*	....	....
12 months	Can—air	Inedible	56	68	28	3	1	..	..	5.0	28.2
	Can—N_2	Inedible	56	64	32	3	1	..	..	0.0	24.8
	Can—CO_2	Inedible	58	65	30	3	2	..	..	0.7	98.9
	Carton	Inedible	58	84	16	..	..	..	..	....	....

*These values indicate the possible formation of reducing materials other than ascorbic acid resulting in the apparently high results. Because of this, and the fact that the product was no longer edible, the ascorbic acid values were not determined at the twelfth-month examination. After 6 months of storage all samples had a disagreeable burnt or caramelized odor which was even more pronounced at the later examinations.

TABLE III—Results of Examinations of Dehydrated Onions Stored at 130 Deg. F.

Storage time	Package	Flavor rating	Drained weight (grams)	Color (dry product) %N-1 (black)	%5YR6/12 (orange)	%5Y9/14 (yellow)	%N-9.5 (white)	Ascorbic acid content (mg./100 gm.) Reduced	Total	Gas analyses %O_2	%CO_2
				Moisture content of product—3.5 percent							
Initial examination	Can—air	...	..	..	..	..	..	..	..	....	....
	Can—N_2	7.6	56	45	10	34	11	53	83	0.4	0.2
	Can—CO_2	7.6	57	45	13	31	11	..	..	0.6	97.7
	Carton	..	..	..	..	..	..	..	..	....	....
1 month	Can—air	Inedible	..	83	15	..	2	46*	76*	1.6	43.8
	Can—N_2	Inedible	..	83	15	..	2	56*	80*	0.4	32.4
	Can—CO_2	Inedible	..	83	15	..	2	50*	79*	0.3	97.3
	Carton	Inedible	..	83	15	..	2	52*	75*	....	....
1½ months	Can—air	Inedible	45	90	10	..	..	..	..	....	....
	Can—N_2	Inedible	48	90	10	..	..	..	..	....	....
	Can—CO_2	Inedible	44	90	10	..	..	..	..	....	....
	Carton	Inedible	47	90	10	..	..	..	..	....	....
3 months	Can—air	Inedible	44	94	6	..	..	..	..	0.3	66.5
	Can—N_2	Inedible	43	93	7	..	..	..	..	0.2	62.5
	Can—CO_2	Inedible	48	94	6	..	..	..	..	1.5	89.2
	Carton	Inedible	42	95	5	..	..	..	..	....	....

*Ascorbic acid analyses made after two weeks of storage instead of 1 month.

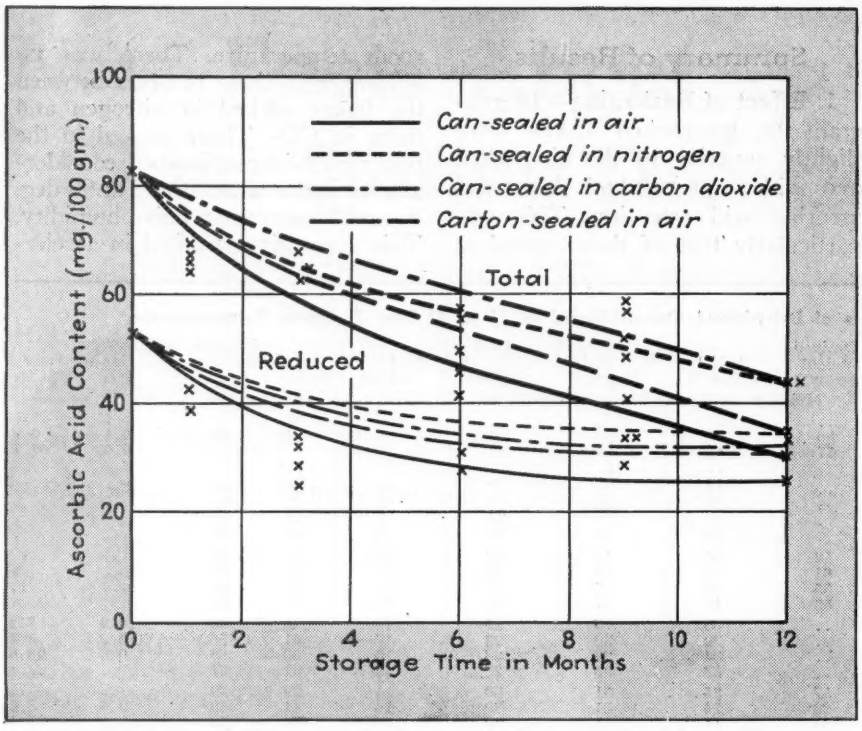


FIG. 4. Effect of storage time and packaging on total and reduced ascorbic acid content of dehydrated onions stored at 75 to 80 deg. F.

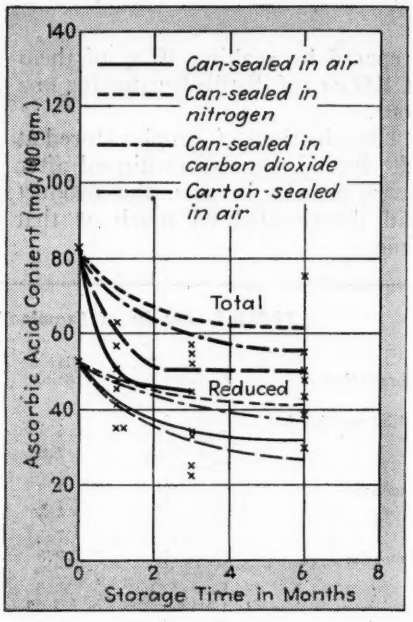


FIG. 5. Effect of storage time and packaging on total and reduced ascorbic acid content of dehydrated onions stored at 98 deg. F.

ated deterioration of these samples, as was evidenced by the considerably darker color of them at the later examinations.

2. Effect of Storage Time and Temperature—Storage at 130 deg. F. quickly reduced the overall quality of this product. After one month at this temperature it had become very dark in color and was judged inedible. Storage at 98 deg. F. also quickly reduced the overall quality; the flavor fell below the passable level in three months. The loss in flavor was also accompanied by a darkening in color. About 60 percent of the original ascorbic acid was retained in this time.

At 75 to 80 deg. F. (room temperature) the dehydrated onions were fairly stable in flavor, color and ascorbic acid content, especially when gas packed. About 75 percent of the original ascorbic acid was retained after six months of storage and better than 50 percent retained through one year.

Large quantities of CO_2 were evolved from the product stored at high temperatures, resulting in appreciable pressure in the cans; 66 percent CO_2 was found in the air-packed can stored three months at 130 deg. F. At 98 deg. F., the amount of gas liberated was considerably less but still appreciable.

The values indicating the ascorbic acid content of this product stored at 98 deg. F. showed an increase

(Turn to page 140)

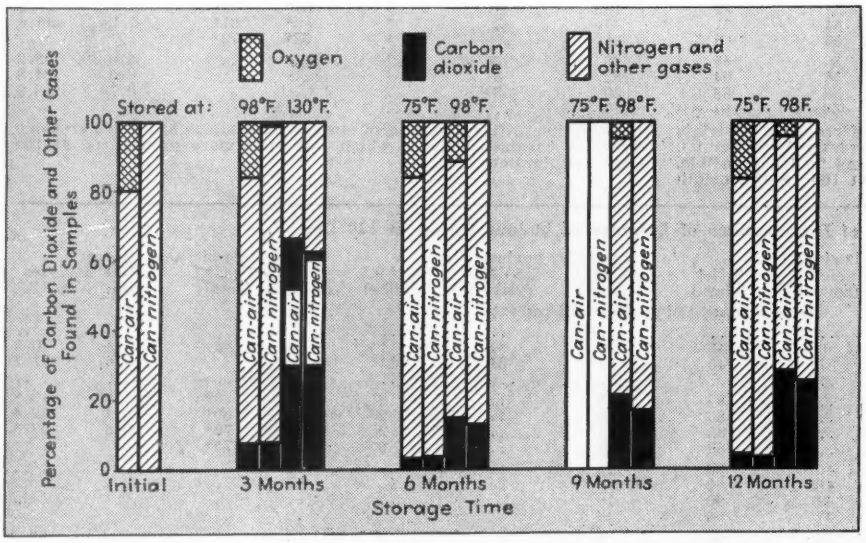


FIG. 6. Effect of storage time and temperature on evolution of CO_2 by dehydrated onions packed in air and in nitrogen.

TABLE IV—Results of Periodic Weighings of Dehydrated Onions Packed in Paper Containers and Stored at 98 Deg. F. and 93 Percent Relative Humidity.

Storage time	Number of samples weighed	Average percent increase in product weight over original*
Initial examination	25	....
1 month	24	1.06
3 months	20	1.42
6 months	18	2.33
9 months	17	2.68
12 months	16	3.30

*These figures are corrected for the weight of water absorbed by the paper in the container (4 percent increase in container weight in 5 days).

TABLE V—Results of Periodic Moisture Content Determinations on Dehydrated Onions.

Storage time	Storage temp. (deg. F.)	Package	Moisture content (% of total wt.)
Initial examination	.....	.....	3.5
1 month	98	Carton*	3.9
3 months	98	Carton*	5.0
6 months	98	Can—air	4.0
6 months	98	Can—N_2	4.1
6 months	98	Carton*	6.2
6 months	75–80	Can—air	3.4
6 months	75–80	Can—N_2	3.5
6 months	75–80	Carton	3.4
9 months	98	Can—air	4.2
9 months	98	Can—N_2	5.2
9 months	98	Carton	7.1
9 months	75–80	Can—air	4.0
9 months	75–80	Can—N_2	4.0
9 months	75–80	Carton*	4.0
12 months	98	Can—air	4.6
12 months	98	Can—N_2	4.5
12 months	98	Carton*	8.2
12 months	75–80	Can—air	3.9
12 months	75–80	Can–N_2	3.9
12 months	75–80	Carton	3.9

*The paper packages stored at 98 deg. F. were also subjected to a relative humidity of 93 percent.

EDITORIALS

LAURENCE V. BURTON, Editor

How To Build for Future

THE reason for the story about factory management under a labor government in this issue should be made clear to all, especially to our Australian readers. It is our conviction that the problems now facing industries in Australia and New Zealand will in a very short time be facing American industry. In matters of labor disputes, Australia seems to be several years ahead of the United States.

In America we are having plenty of strikes, but the reasons for the strikes appear to be slightly less frivolous than those occurring "down under." But there is no occasion for self-congratulation in America. Our own work stoppages in the midst of a first class war are nothing short of a disgrace.

On the constructive side, there is something to be said—something that it is hoped that all business men will heed. Unless organized labor is quickly able to develop capable, level-headed leadership comprising men who have statesman-like vision, we shall travel the rough path that our Aussie friends have been traveling. Their problems stem largely from the fact that the rank and file will not follow their chosen leaders. The leaders cannot control. Hence, the frivolous strikes. Every industrialist and all his subordinates should endeavor to help worthy leaders to achieve real leadership. The least that can be done is to avoid undermining by ridicule or contempt any leaders who show promise of taking the place in the esteem of the rank and file of workers that once could have been retained by management but has long ago been lost.

Recently, R. J. Thomas threatened to resign from the presidency of UAW if the union should break its "no strike" pledge. Such an action deserves commendation. We need more labor leaders who are motivated by such a sense of honor and yet able to control the irresponsibles in their organizations. The country needs more men like Robert Watts of AF of L and Clinton Golden of CIO. These men are very capable citizens, and if all unions were headed by men of similar capacity the country would be far better off in the days to come.

All this is not to deny that labor has done many things we do not commend. But they have the political power as far as numbers alone can give it. Industrial peace in the future will require that labor have good leadership. If it should, alas, have the poor leadership of the demagogue, then the future will be one of continued strife. If America misses its opportunity and the irresponsibles gain control, you can get a pretty good picture of what is in store by observing what is currently going on in Australia.

Extreme Patience Needed

Now that autumn is here, maybe you have just begun to get back into the harness after your summer vacation. Maybe you can remember how hard it was to get back to work after you returned to the job, especially if your vacation came early in the summer. Presumably your holiday was only the customary two weeks.

Suppose, however, that you had been away from the job for two years. How long do you suppose that it would take before you could do a decent day's work? This department has been off the job for six months, "just ramblin' around" in far-off places—not fighting. And it is devilishly hard to get down to work again, even if no dead Jap ever offended the olfactory nerve. Every day when work starts we vow that this day will be a full day, measure for measure, but when night comes most of the effort has been fruitless.

What must it be for a returning soldier, one who has seen plenty of drudgery or action, or one whose nerves have been badly jangled?

In the light of the trifling experience of this commentator, the problem of putting the returned soldier back to work is one that will call for infinite patience. The longer he has been off the job the more difficult it will be for him to get back into harness. All employers should approach the problem with patience and understanding.

Surpluses — The Price Of Victory

FOOD either is, or it is not, a munition of war.

That it is a munition of war has been declared on many an occasion. Secretary of Agriculture Wickard was one of the first to so designate it, and his pronouncement has been followed by similar statements from other government officials. Our allies in the war with Japan—Australia and New Zealand—have adopted similar polcies. England has the same policy.

Why, then, has there been this sudden outburst against an adequate supply of the one munition of war for which there can be no possible substitute? Judging by some of the recent comments, there is something reprehensible about having plenty of food.

Somehow, many of the recent remarks do not make good sense. The peace in Europe has not yet been won. Food is being rationed in every one of the major belligerent countries. And Sweden, one of the larger neutrals, has long been experiencing as tight a food rationing suituation as Great Britain. It is fortunate, indeed, that there is apparently enough food in sight to take care of the needs of all. Nevertheless, the big squeeze is not to be expected until the last half of 1945.

According to the September 7 report of Director of War Mobilization, James F. Byrnes, there are "approximately 6,000,000 tons of food available against requirements of 3,900,000 tons for the first half of 1945." This is food other than wheat. He does not discuss the wheat situation at all.

How big is this surplus of 2,100,000 tons? How many people will it feed if they have no other source of food?

According to the average peacetime American dietary, we consume about 1,650 lb. of food per person per year. One suspects that the Allied food reserves are a bit more

concentrated than normal American food, so let us assume that for relief purposes 1,000 lb. of this food will keep one person alive for one year. On this basis, then, the Byrnes surplus quantity is sufficient for feeding 4,200,000 persons for one year. This is about the job of feeding Michigan or New Jersey for a year, or Belgium for a half year. It hardly seems to be a quantity large enough to merit much excitement.

Food is, however, one of the few items in use in warfare that has peacetime utility. Which is why many persons fear an oversupply. It might be large enough to break the peacetime markets, just as is alleged to have occurred in 1920 and 1921, only that was not the whole story.

But peace is still a long way off, especially in the Pacific. All the attention towards relief has been directed to feeding liberated European nations. No public statements have been made about the problem of feeding the liberated countries of the Pacific, especially the Philippines, where we have an obligation far exceeding the moral obligation of feeding Europeans. What little knowledge we have of the horrible condition of survivors of Japanese captivity in New Guinea leads one to expect emaciation to a far greater degree than even in Greece under the Nazis.

Allied military superiority in this war is due to many factors, not the least of which is the ample supply of all sorts of equipment and supplies. If all quantities were calculated out to a nicety so that the last shell were fired on the presupposed date of the enemy's surrender, then it would be forgone that we would lose the war. When victory comes, we must still have enormous quantities of nearly everything. That is the price of victory. The side which ends with everything used up is the one which surrenders. That is the cost of defeat.

There is, however, something needlessly sacrosanct about food. Probably it is so regarded because of the impossibility of using food for any other purpose, or of finding a substitute for food. When victory comes we shall have no compunction at all about dumping millions of rounds of surplus small arms ammunition into the sea, or any about melting up thousands of tanks for scrap, or junking millions of items of all sorts of battle equipment. But if we should end up with a few million surplus tons of food, there will be a cry of mismanagement.

Mismanagement will occur only *after* the shooting and the relief is all over. If we let the surplus get into the hands of unpleasant speculators after the war is over, that *will* be mismanagement.

Frankly, if we are to win this war, we see little to quibble about at the present time. If stockpiles are now ample, the program for the future can be reduced accordingly.

Man-hours Required for Food Raw Materials

PRODUCTION per worker largely determines the cost of any item. This fact is just as true of the raw materials purchased by food manufacturers for processing as it is of the materials made in the food factory. New indexes on this subject are now available as a result of studies carried out by Bureau of Labor Statistics for various classes of farm products.

Output per farm worker has increased during the war period substantially. Taking 1939 as a base at 100, the output of all farm products for the whole United States was 115 units per worker in 1942 and nearly 120 units per worker in 1943. The greatest increase developed in meat animals (120 and 130 for the two years) and poultry (120 and 135 units). Food grains increased to 132 and 112 units, the latter figure being low because of low yields last year. Much less increase occurred per worker in milk and wool. Sugar crops and fruits and nuts units actually declined in 1943.

The most striking change in output were the oil seed crops, where 181 and 202 are the index figures for the two years noted. This apparently indicates greatly increased effectiveness in production methods which seems to have been very general throughout the United States. The conclusion appears justified that food oils, as well as paint and industrial oils, are going to cost fewer man-hours per unit in the future than in the past. That will have important significance in determining oil competition.

Food for School Lunches

FREE school lunches are again being talked about in Washington. They have a marvelous social appeal, even when vote getting is not in the mind of the advocate. Obviously, one can always make a good argument for adequate feeding of the children to give us a healthy next generation.

This Autumn there will be a new food problem involved that may develop peculiar difficulties for our industries The preferred free school lunch is based on a bottle of milk for each child at suitable recess or noon intervals. But there is not enough milk for other purposes; and there will be strenuous effort by industrial milk users to shift the school lunch program to some other food basis.

This situation may develop new opportunities for other food manufacturers. Those who can offer a desirable foodstuff for this use with the youngsters have now a real opportunity. Later on, there probably will be milk surpluses, and then the dairy industry will again be competing for this business. Meantime, what have you got to offer?

Quality Measurement Vs. Control

A REGRETTABLE absence from the symposium on food quality and flavor during the recent meeting of the American Chemical Society was any mention of the matter of *control* of quality. In all the discussion of the measurement of quality factors, little or nothing was said about how to control them. Admittedly, it is necessary to be able to measure before control can be instituted, but any youngster in the audience who might be avidly seeking knowledge conceivably might have been misled into a belief that would be wholly false. He might have gained the erroneous notion that measurement of the factors is all that a chemist needs to do to control quality. We should like to have heard how needed changes in the measured quality factors could be brought about.

Fortunately, however, very few young men were present, most of them being in the armed forces, and the lack of a suitable integration of measurement into the larger field of quality control could not have affected many.

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NEW PACKAGES & PRODUCTS

Pillsbury Redesigns

SEVEN of its products were selected by Pillsbury Flour Mills Co. for package redesign. No changes in size or materials were involved. The new design follows the current trend in the use of lettering to achieve a decorative pattern, with care to have the product name on each face of the package.

A new trademark, a "P" in white, shaded gray, with the name Pillsbury in white against a deep colored swirl, is featured on each package. Most are in a clear bright blue with red accents, but yellow cornmeal and one of the pancake mixes are in brown and orange. The same design on a 3½-lb. bag is used in some markets for pancake flour.

Spaghetti and Sauce

SAUCE said to be prepared from a traditional Italian recipe is offered with 100 percent semolina flour spaghetti in Aunt Stella's Spaghetti Dinner, made by the Kentucky Macaroni Co., Louisville.

The sauce is packed in an 11½-oz. glass jar with an Anchor cap, and is ready for use when heated. It contains no meat or meat flavoring, but does contain mushrooms, finely chopped. Tomato paste and tomato puree, salt, sugar, mixed spices, garlic and vegetable oil are the other ingredients.

A carton containing 7 oz. of spaghetti is packed with the jar of sauce in a blue and yellow box.

Fresh Fruit Powders

DEVELOPED originally for domestic use, but taken over for inclusion in military ration kits, dehydrated fruit juices for beverage making are reaching the domestic market.

Sunway Fruit Products, Chicago, is offering Freshie beverage-base powders in lemon, lime and orange flavors. Each consists of dehydrated tree-ripened fruit juice, reinforced with the corresponding concentrated fruit oil, citric and tartaric acids, a tri-calcium buffer salt and with suitable certified color added.

Being unsweetened, the product can be rehydrated for use in mixed-drink recipes calling for lime or lemon juice, or made up with sugar and water as a true fruit beverage.

The powders are packed in heat-sealed printed cellophane envelopes, containing ½ oz. each, shipped 36 to a box in a folding chipboard carton which can be used as a display case.

New Swift Product

SWIFT & Co. is offering a dehydrated meat extract in test markets. At present no plans have been made for wider distribution.

The product, called Swiftee, is made of dehydrated soup bone stock and meat extract, with flavorings. It is intended for use in soups, gravies, hot drinks, casseroles and as an extender.

The light brown powder is packed in a glass jar with a metal screw cap, holding 2½ oz. A folding carton repeats the label design of the jar, with the name in white on a red band, against an orange background, in appearance much like the well-known lard carton.

Crumbs for Frying

BREADING for deep fat frying is made easy by the use of Dip-N-Fry, a product introduced by Consolidated Biscuit Co., Chicago. In this, eggs and dry skim milk are added to toasted wheat flour, together with salt and spices. The mixture is somewhat finer than the usual cracker or bread crumbs, and adheres readily to meat, fish or croquettes.

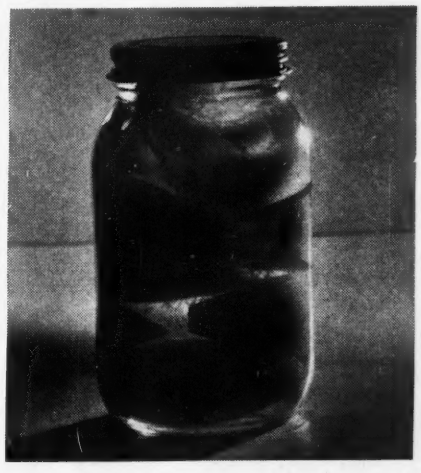
For institutional use, 5-lb. drums are packed, while the consumer package contains 10-oz. in a spiral wound chipboard cylinder with slipover paper ends. The sulphite tight-wrap label is attractively printed in 3 colors.

Exposito Oranges

ORANGE SLICES in heavy cane-sugar sirup, with fresh lemon juice and wild honey added, are being packed by Gamson and Esposito, Long Island City, N.Y.

Suggested uses include Old Fashioned cocktails, fruit salad, puddings and other desserts, ice cream topping, and with entrees or poultry.

The jar is shown here without its simple, neat label, printed in blue on white, in order to show the attractive effect of the orange pieces in the clear sirup.



Cakes Without Work

VANILLA and chocolate-flavored cakes have been added to the list of mixes produced by Cramer Products Co., New York, under their Joy brand name.

These mixes are of the type to which a small quantity of cool water or milk is the only addition needed, with a minimum of mixing. Besides cake flour, sugar, shortening, egg, milk powder, baking powder, salt and flavoring, the label lists lecithin and carotene among the ingredients. Part of the sugar is dextrose. The chocolate-flavored mix contains cocoa.

Packages are bag-in-box. The heavy waxed paper bag is well sealed against sifting. The folding cartons are printed with the same design, showing the name on each face, with a picture of the cakes on the front. Printing is brown against yellow for the chocolate-flavored, and brown with blue for the vanilla mix.

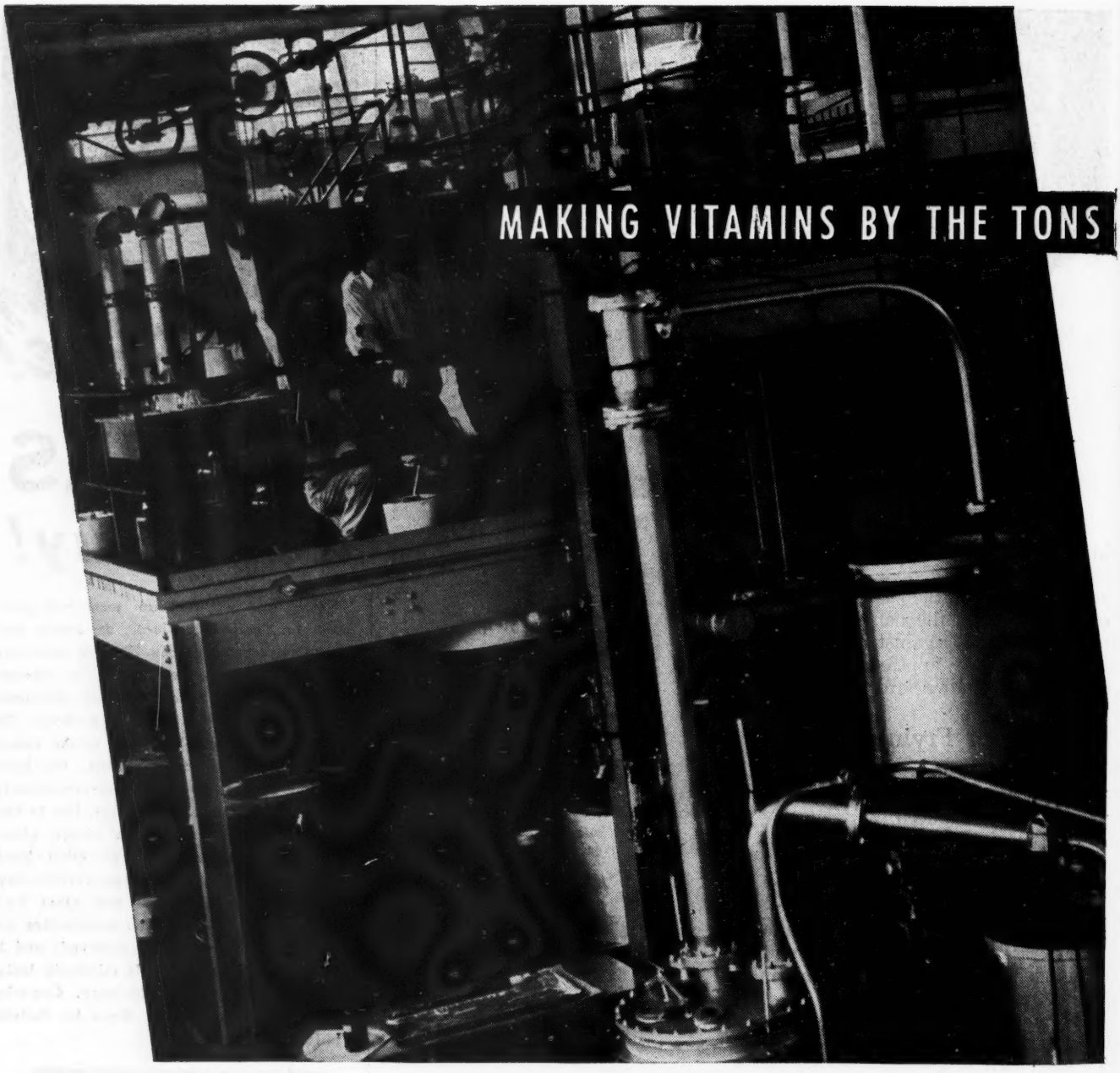
Each package holds 9½ oz., enough for one 8-in. cake.

STONES
Good Buy!

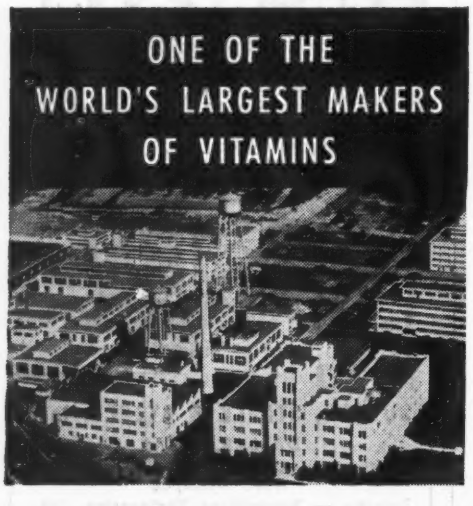
Costly and wasteful are most mill processes for "stoning" cereals, soy-beans and other dry-processed foods. Now, at relatively small investment, the process is streamlined, costs cut to a fraction of old, laborious, hand or semi-hand picking methods. To eliminate this great headache of the cereal and other dry food processors, we have developed a new type stoner—revolutionary in design, amazing in efficiency, low in first cost, in operation. Removes stones, glass, non-magnetic metals, and all other hard, dangerous contaminations from cereals, soy-beans, and other beans, and other food products, with, 1) an action so sensitive the tiniest particles are easily removed; and 2) operating cost so low it is relatively insignificant; and 3) 99.9% efficiency. Capacity up to 16 tons per hour. Write for Bulletin FI-944.

SS&S AIR-FLOAT STONER

SUTTON, STEELE & STEELE, Inc.
DALLAS, TEXAS
In Canada—Kip Kelly, Ltd., 68 Higgins Ave., Winnipeg
Foreign — Separations Engineering, Ltd., 133 Bush House, Aldwych, London



EASIER VITAMIN ORDERING



IMMEDIATE B_1 SHIPMENTS can now be made to customers whose monthly orders total 2,000 grams or less, and no certificate of use is required.

NO MORE WPB-2945 forms are required from users of larger quantities of thiamine; instead we apply to WPB for you. Simply get your purchase order to us by the 15th of the month for the B_1 you want the following month, affixing a use certificate.

RIBOFLAVIN is off allocation entirely.

ASCORBIC ACID—Vitamin C—Users of 30 kilos or less per month can now get immediate delivery at any time without allocation.

If at all in doubt as to procedure for obtaining vitamins still on allocation, contact our Vitamin Division. And *whenever* you order vitamins—B_1, B_2, B_6, C or E—specify 'Roche' and rest assured of getting the finest science can produce, in the most desirable forms, at the lowest prices consistent with uncompromising quality.

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FOOD INDUSTRY NEWS

The Food Industry Faces Some Peace Hurdles of Its Own

Conversion from war production will be more difficult than need be unless present confusion is clarified soon

WASHINGTON is struggling with the problems of getting American economy readjusted to peace. Most of these problems have significance for the food industries. And some of them, at least, can be identified as having early significance.

Cutbacks—Cancelling production orders is obviously the first big job. This job rests primarily with the agencies that have made the contracts. Back of these agencies are the military planners and WPB. Apparently no new legislation is needed. Administrative decisions as to policy are urgently wanted, but not forthcoming promptly. The pattern is confused because, as is customary, no one is given final definite authority to work under certain given rules.

Contract Settlement—Congress has enacted broad legislation. But the basic principles set forth are applied quite differently. Some of the differences result necessarily from differences in goods or contract terms; but more often the differences result from varying judgment or policy of different offices.

Reconversion Controls—The explosion within WPB seemed to relate to the question of controlling reconversion of industry. Actually, the causes were much deeper. Hence, the resignation of Wilson and the China trip of Nelson, leaving Krug in charge, solved nothing. It was not evident in mid-September who would boss reconversion and under what rules.

Surplus Disposal—Most of the controversies over methods and policy will have little influence on surplus food stocks; but the new law will determine the plans for disposal of industrial property, machinery and facilities, much of which may be usable in modernized or new food plants. Every industrial organization is, therefore, confronted with the necessity of keeping track of this surplus to see whether his competitor is getting it and whether it is going to have a new impact on food manufacture. The problems of food surpluses themselves require entirely separate consideration.

Food Programs—The entire trend of American food policy seems completely indeterminate in Washington. There are four or five major philosophies in legislative and executive groups. Until after election, the policy of expediency will govern. By that time the European situation will have clarified. It will then be possible to reveal the food supply situation of the United Nations. It will then be evident who is going to feed the areas released from Nazi control (presumably the Army rather than UNRRA). And perhaps by then an administrative and Congressional decision will be reached regarding next year's crop goals.

Price Controls—There are all imaginable varieties of theories in Washington as to how price controls will be relaxed and when or how OPA will withdraw from its administrative authority, including rationing. The New Deal faction wants to retain as much authority as possible. Most conservative groups want OPA to go out of existence as soon as possible. Election day may decide many of these questions. If not, Congress will act later.

Peace Formulas—The conference at Dumbarton Oaks is setting a pattern for international relations. Less noticed, but more important to the food industries, are the negotiations leading to a permanent substitute for UNRRA, which is now being called Food and Agriculture Organization. This FAO will set the pattern for postwar policies in international food and agriculture. Sooner or later, these policies will have to come to Congress for approval. The appointment of Henry Wallace as head of this organization is rumored.

Surpluses Predicted Sooner or Later

WASHINGTON generally accepts the theory that we shall now approach a surplus situation for almost all foodstuffs. That generalization is modified radically by different observers, largely with respect to the date at which the surpluses will begin to bear down on the market. This seems to be the consensus:

Wheat supplies now available are more than adequate, but will not cause burdens until the disposal of the 1945 crop becomes a major problem. Corn will be fairly abundant soon. WFA expects to release corn from any restrictions as soon as the present crop flows freely into granaries and elevators. But real surpluses are not expected in the corn market for more than a year. It is quite probable, guessers say, that the 1945 crop will be absorbed readily at a fair price even if large.

Soybean supplies will be burdensome soon. It is questionable whether this year's production can promptly be absorbed without some break in the markets. This comes about partly, perhaps principally, because of the apparent abundance of all fats and oils except coconut oil for soap.

Fats and oils of other types may become surplus and burdensome with present production rates as soon as imports of coconut oil can be resumed on a big scale from the South Pacific. Meantime, Europe is very fat hungry and will absorb anything which America can spare as soon as transport can take it overseas. German collapse means easy transport, even for lard. Hence, the present surpluses of lard probably will begin to move into Europe before spring and thus relieve the United States situation. If the pig crop next year is smaller, as expected, we may not need to worry about lard or other fat surpluses until about 1947.

Protein supplies of the world will build up slowly. It may be 1948 or 1949 before meat and other proteins will become sufficiently abundant to cause any domestic concern. Meantime, this country will be helping to supply protein food while the other nations build up their herds and flocks.

Press Association Photo

BEEF FOR LIBERATED PARIS

While the freed inhabitants were not as hungry as it was anticipated they would be, the cattle, shown here as they were driven to slaughter through a Paris street, were most welcome.

Frozen Food Lockers Increasing Rapidly

FROZEN food locker plants in the country now number 5,282, according to a recent announcement made by the Department of Agriculture. In the past seven years the total of such plants has more than quadrupled. Last year's increase was 723 new plants. This figure does not include additions to old plants or installations still under construction. The figures quoted here are from the seventh annual count of locker plants made during the month of July by the state extension services.

The new cold storage order, WFO-111, bans the use of freezer space in any cold storage warehouse for lots smaller than 300 lb. Frozen food locker plants, which are not covered by the order, are expected to handle the storing of the small lots of food, which will be forced out of the commercial plants.

More "A" Awards Added To Food Plant Lists

MORE than 200 food plants have won the War Food Administration's "A" award since this recognition of achievement was first announced a year ago. Plants recently added to the award winning list include the following:

Black & Gay, plants at Brooks and Thomaston, Me.; Everitt Packing Co., Underwood, Ind.; Libby, McNeill & Libby, Hartford; Rockfield Canning Co., plants at Granville, Jackson and Rockfield, Wis.; E. A. Couture Dehydrator, Modesto; Libby, McNeill & Libby, plants at Sacramento and Sunnyvale; Matmor Canning Co., Inc., Woodland; Mission Valley Canning Co., San Jose, Calif.; Rogers Canning Co., plants at Athena and Milton, Ore.; Bozeman Canning Co., plants at Ellensburg, Monroe, Mt. Vernon and Waitsburg; National Fruit Canning Co., Chehalis, Wash.

R. J. Peacock Canning Co., three plants, one at Eastport and the Lubec and Union plants at Lubec; B. H. Wilson Fisheries, Eastport, Me.; American Processing Co., New York; The Quaker Maid Co., Inc., Brockport, N. Y.; C. L. Dick and Co., San Jose, Calif.; The Amalgamated Sugar Co., Burley, Idaho.

SERVICE AWARD

The first Special Service Award given by the Quartermaster is here being presented by Maj. Gen. Edmund B. Gregory, Quartermaster General, to J. Howard Hamilton, San Francisco executive of the American Can Co., for "directing and developing the canned food procurement program."

Research Institute Is Formed in South

WITH A VIEW to utilizing the vast raw material resources of the south, the Southern Research Institute has been formed and can now point to a fund of $400,000 for its implementation. The fund, subscribed entirely by business firms and individuals in the southern region, is expected to reach $1,000,000 before long. Wilbur A. Lazier, former research group leader in the chemical department of E. I. du Pont de Nemours & Co., was recently appointed director.

A brochure outlining the purposes and function of the institute may be had from J. A. Maguire, 600 North 18th St., Birmingham 3, Ala.

Merger Expected

A MERGER of the United States Brewers Association and the Brewers Foundation is expected by members of the industry. While no formal announcement had been made up to the end of September, it was understood that the details were being worked out and that an announcement would be forthcoming when the plan was completed.

Correction

IT HAS been called to our attention that a misstatement was contained in the item, "New Can Size, Label," on page 99 of the July issue of "Food Industries." The statement read: "Wartime restrictions for lithographers have prevented the use of more than one color on cans. . . ." There is no government order stipulating that only one color may be used.—The Editors.

DEVELOPMENTS IN DISTRIBUTION

Cork Supply Improves As Shipments Increase

CORK SUPPLY has undergone an abrupt change for the better, resulting in a proposal to increase monthly allocations. It cannot be said that an ample supply of cork is assured, although unofficial opinion is that the worst is over.

The present situation stems from the arrival in recent months of concentrated shipments which have increased the stockpile materially. Figures on imports for June and July show arrivals of approximately 10,000 tons per month, a marked improvement over the average for the first 6 months of the year, which amounted to less than 4,000 tons per month. Estimated stocks on the first of August were approximately 64,000 tons.

The industry has been informed by the government that upward revision of the monthly allocation for the fourth quarter "will be explored despite possible decrease in imports." The note of caution expressed in the official attitude has nothing to do with the availability of ocean shipping space, of which there is plenty. Spain is now suffering from a labor shortage. The cork "strip" is not large. Adding to the difficulties is the weakness of Spain's transportation system, which is in bad shape.

Predicts Light Demand For Our Food in Europe

THERE will not be a heavy demand for food from the United States to take care of the liberated peoples after the war in Europe ends, according to a special report to the President by War Mobilizer James F. Byrnes. As Mr. Byrnes sees it, there will be released "from the wartime pipelines or reserve for other uses" about 8,000,000 tons of food. He estimates that about one-fourth of that amount will be available from the stocks built up in Britain, with 4,000,000 tins coming from a 50 percent cutback in Army requirements. In addition, there will be available considerable stocks of combat rations in the European theater. Mr. Byrnes estimates the requirements as 3,900,000 tons of food for civilian relief in Europe for the first half of 1945.

New Cold Storage Order Limits Frozen Foods

THE FROZEN food industry expects to have little difficulty in complying with the new cold storage order, WFO-111. This order contains three new restrictions: (1) It bans the use of storage space for lots smaller than 300 lb.; (2) it prohibits the use of barrels and baskets for storing poultry; and (3) it limits the quantity of frozen fruits, vegetables and packed frozen fish to the quantity stored on Oct. 1, 1943.

The limiting of the quantity of frozen fruits, vegetables and fish is not expected to hurt the industry. The new order actually says that space will be made available for approximately 400,000,000 lb. of an expected production of about 500,000,000 lb. The industry is left to determine the products to be stored. The order might be said to serve notice on the industry to keep a free flow of products moving into commercial channels. An acceleration of movement into distribution and the early disposal of slow-moving items is expected to provide space for the 100,000,000 lb.

The small lot limitation is considered, by officials of the WFA, to be a good thing for both the warehouse operators and the frozen food industry.

AIR-BORNE LETTUCE

This Detroit lady is said to have willingly paid an extra nickle for a head of fresh lettuce flown from California in test.

More Dehydrated Food Required by Army

NONCIVILIAN claimants are expected to receive 30 million pounds more of dehydrated vegetables during the 1944-45 fiscal year than was estimated in preliminary allocations released last April, but civilian requirements remain unchanged, the War Food Administration told a meeting of the Dehydrated Vegetable Industry Advisory Committee recently.

Contract Terminations

A PAMPHLET recently issued by the War Department for government contractors is designed to expedite the handling of contract termination settlements.

Under the title, "Contractors Guide," the pamphlet is being distributed to contractors so that they may become familiar with the termination procedure.

SCHEDULE OF EVENTS

OCTOBER

3- 5—American Public Health Association, 73rd annual business meeting and second wartime conference, Hotel Pennsylvania, New York.
8-14—Fire Prevention Week.
12-14—Master Brewers' Association of America, meeting, Hotel Jefferson, St. Louis.
16-17—Boston Conference on Distribution, 16th annual meeting, Hotel Statler, Boston.
17-18—American Bakers Association, enlarged meeting of board of governors in place of conference of members originally scheduled. Morrison Hotel, Chicago.
18—National Pickle Packers Association, fall meeting, Bismarck Hotel, Chicago.
19-21—National Association of Food Chains, annual convention, Drake Hotel, Chicago.
24—National Association of Retail Ice Cream Manufacturers, quality control production conference, Chicago.
25-26—Association of Official Agricultural Chemists, meeting, Hotel Statler, Washington, D. C.
25-27—American Oil Chemists Society, 18th annual fall meeting, La Salle Hotel, Chicago.
25-27—American Dietetic Association, 27th annual meeting, Palmer House, Chicago.
26-28—National Coffee Association, annual meeting, Homestead Hotel, Hot Springs, Va.

NOVEMBER

1- 2—Packaging Institute, annual meeting, Hotel New Yorker, New York.
2- 4—International Association of Milk Sanitarians, annual meeting, La Salle Hotel, Chicago.
13-14—New England Bakers Association, fall conference, Hotel Statler, Boston.
15-19—American Chemical Society, third national chemical exposition, Coliseum, Chicago.

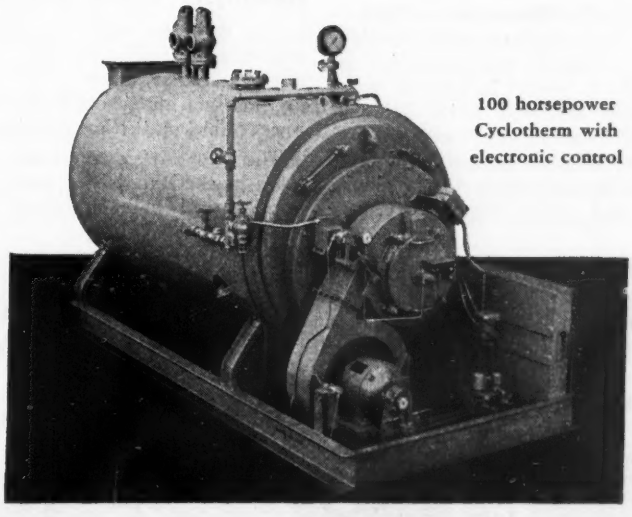
DOLLAR EFFICIENCY—work done per dollar spent—measures the value of steam generation

Exclusive principles of combustion and design have given Cyclotherm an outstanding record of efficiency and economy among steam generators. Because of its combustion principles and design, Cyclotherm meets the dollar efficiency test throughout its wide power range (10 to 300 horsepower) in units that are both oil and gas fired.

Whether used for power, processing or heating, a Cyclotherm makes an enviable record in steam production per unit of fuel consumed.

Cyclotherm Steam Generators are fully automatic, strongly built and fully self contained. They will give you years of trouble-free service for they are designed and constructed for exacting service with a minimum of attention.

While the range of available units obviously cannot be on a peacetime basis, if you are planning immediate replacement, our engineers will gladly cooperate in meeting your needs. Any additional information desired will be supplied promptly.



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Stiff Demurrage Charge On Refrigerated Cars

COL. J. Monroe Johnson, Interstate Commerce Commissioner and director of the Office of Defense Transportation, has announced that ICC Service Order 180, which provides penalties for holding railroad refrigerator cars beyond a reasonable time for unloading, is again effective as of September 9.

This order establishes demurrage charges on any refrigerator car, loaded with any commodity, not unloaded within 48 hours free time. After the free time, the charges are $2.20 a day for the first two days, $5.50 for the third day, $11 for the fourth day, $22 for the fifth day, and $44 for each succeeding day. These heavy demurrage charges are intended to make holding of refrigerator cars for storage beyond five days too costly to be profitable.

Record Production Ups Allocation of Citrus

WITH indications of a record production of citrus fruit during the 1944-45 season, substantially more of this commodity in fresh and processed form than was allocated last year, is expected to be available to United States civilians during the next year, the War Food Administration said in announcing allocation for the period July 1, 1944 to June 30, 1945.

From total allocable supplies of about 153,000,000 lb., civilians will receive slightly more than 83 percent, which is approximately 8 percent in amount more than they were allocated during 1943-44. Military and war services will receive slightly more than 12 percent, while the remaining 5 percent will go to our allies, territories, and other friendly nations.

Brazil Donates Coffee To U. S. Armed Forces

A GIFT of more than 52,910,400 lb. of coffee given by the people of Brazil to the United States fighting forces has been completely delivered. Shipment of the last 100 sacks, of the 400,000 donated through Brazil's President Getulio Vargas last July, was witnessed by the Consul of the U. S. in Sao Paulo, Mr. Cecil M. P. Crosse, and Vice Consul Arthur G. Parsloe. This volume of coffee will make 1,777,789,400 cups of coffee for members of the United States Army, Navy and Marines in the front lines.

Tinplate Production Drops in Last Quarter

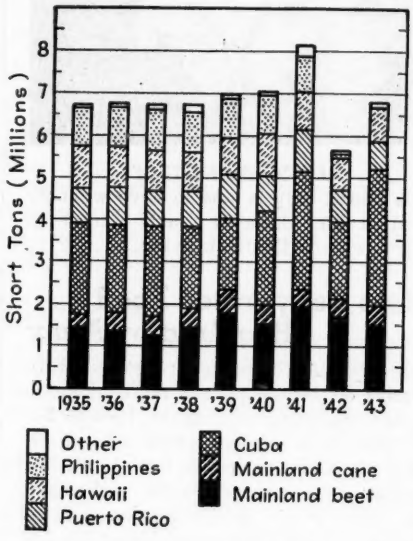
BECAUSE the bulk of the summer crop yield is packed during the peak second and third calendar quarters, tinplate production scheduled for the fourth quarter of 1944 will be 125,000 tons smaller than the third quarter output, WPB officials informed the Tin Plate Industry Advisory Committee at a recent meeting.

About 750,000 tons of tin mill products is scheduled for production in the last three months of this year, WPB officials said. This compares with the production of 875,000 tons in the third quarter, 825,000 tons in the second quarter and 627,000 tons in the first quarter.

Realigns Food Sections

IN A MOVE to better coordinate fruit and vegetable programs, WFA has placed all fruit sections under a fruit marketing division and all vegetable sections under a vegetable marketing division.

The new divisions replace the processed marketing division which formerly administered both processed fruit and vegetable programs, and the fresh marketing division which formerly administered both fresh fruit and vegetable programs.



The total quantity of sugar delivered by primary distributors in the United States for consumption and export in 1943 was 20 percent larger than in 1942, the increase consisting largely of Cuban sugar. But the amount of sugar available is likely to be smaller next year because of prospects for a smaller crop in Cuba and reduced stocks in both producing and consuming areas. The chart shows estimated U. S. distribution of sugar (raw value equivalent) for consumption and export, by place of origin, 1935-43. It is from the Bureau of Agricultural Economics.

British-Combine

AUSTRALIA'S LAND GIRLS

If you take a second look you see that these girls are carrying bunches of bananas. They are the land girls of Australia. Australia's Women's Agricultural Security Production Service has helped to harvest hundreds of tons of vegetable, grain and fruit crops in the northern coastal areas of New South Wales. These girls hold down regular jobs and help with the harvest in their spare time.

PROCESSING

Quality and Flavor Discussed by ACS

As part of the annual meeting of the American Chemical Society, in New York, September 11 to 15, the Division of Agriculture and Food Chemistry devoted one day to food quality and flavor. Appropriately, the papers were offered as a symposium honoring the centenary of the birth of Havery W. Wiley. An associate of Dr. Wiley for many years, Andrew L. Winton was selected to review the advances toward higher food quality made through Dr. Wiley's own efforts and those of the scientists working under him.

Thomas M. Rector, of General Foods Corp., recommended establishment of a program to integrate research on production and processing of foods. At present there is no way to get a yes-or-no answer to the question of the permissibility of new ingredients, particularly quality-preserving materials, even when they can be demonstrated to lead to improvement of a product. His criticism was directed against inflexibility in law and regulations. There must be cooperation between the agencies entrusted with en-

forcement of food standards and the food processors.

The quality factors in meat are wholesomeness, appearance, composition, tenderness, flavor, juiciness and nutritive value, according to O. G. Hankins, of the Department of Agriculture. Most of these factors can be broken down and evaluated in measurable terms, but flavor must still be judged organoleptically. Improvements in composition and tenderness involve questions of breeding and feed.

Three times a day you have a flavor experiment at your own table, Crosby Gaige reminded the group. Standardized quality, however high, is not enough. The food chemist or technologist should develop an infinite curiosity about food and learn the art of seasoning, of flavor, by trial and error.

However, the volatile constituents of food flavors are organic chemicals with conventional chemical and physical properties. E. C. Crocker, of Arthur D. Little Inc., presented a table showing the respective spontaneous volatilities at room temperature of more than 240 aroma substances representing many different chemical types found in natural flavors. Consideration of these volatilities together with the chemical nature of the material, may enable the processor to avoid loss of flavor through distillation during removal of water in processing or storage.

Elimination or preservation of flavor in food fats is considered by H. E. Robinson and H. C. Black, Swift and Co., to be an important chemical problem. For butter and oleomargarine the question is one of developing and retaining a desirable flavor, but the tendency of the industry, at present, is to eliminate all flavor in vegetable oils and meat fats used for shortening.

New Food Standards Are Issued by Army

THE Quartermaster Corps has issued the following new specifications within recent months. They are listed with the Chicago Quartermaster Depot number and date of issue:

Type C Ration, C.Q.D. 183, June 28, and Amendment 1, August 23. Emergency Parachute Ration, C.Q.D. 302, July 17, and Amendment 1, August 29. Meat and Vegetable Stew, C.Q.D. 8C, July 29, superseding C Q.D. 8B, August 25, 1943. Pork and Rice, C.Q.D. 197, August 3. Meat and Noodles, C.Q.D. 199, August 14. Pork and Corn, C.Q.D. 311, August 16. Meat and Beans, C.Q.D. 194, July 11, Amendment 1, August 21. Canned Hamburgers, C.Q.D. 309, August 16. Frankfurters and Beans, C.Q.D. 300, August 1. Canned Pork Tenderloin, C.Q.D. 308, August 14. Pork Sausage Patties and Apples, C.Q.D. 313, August 19. Dehydrated Cranberries, C.Q.D. 77B, August 23, superseding C.Q.D. 77A, August 12, 1943. Maple Flavoring Tablets, C.Q.D. 118B, August 29, superseding C.Q.D. 118A, February 12. Spreads for Bread, C.Q.D. 320, July 23, 1943, Amendment 1, September 2, 1944. Dehydrated Soups, C.Q.D. 26D, September 1, superseding C.Q.D. 26C, April 20. Ham and Eggs with Potatoes, C.Q.D. 198, September 2. Pineapple and Rice Pudding, C.Q.D. 314, August 19. Steamed Puddings, C.Q.D. 310, August 19. Type D Ration, C.Q.D. 19F, August 5, superseding C.Q.D. 19E, February 15. Roasted and Salted Peanuts, C.Q.D. 177A, September 7, superseding C.Q.D 177, March 29. "War" Style Lard, C.Q.D. 39A, April 12, and Amendment 1, September 8.

Canned Ham with Raisin Sauce, C.Q.D. 189, June 20. Canned Ham with Candied Sweet Potatoes, C.Q.D. 188, June 30. English Style Stew, C.Q.D. 76B, June 8, superseding C.Q.D. 76A, March 31. Biscuits and Crackers, C.Q.D.

I'm "Smoothy"—I sneak into drain pipes, and that's where I stay, causing all kinds of trouble
I'm "Scummy", the grease film that retards bacterial activity in sewage disposal

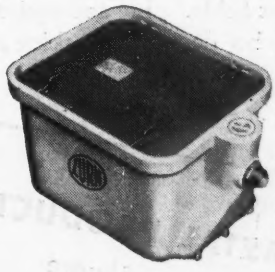
A COUPLE OF SLIPPERY THIEVES WHO ARE DOING AN "INSIDE JOB" ON YOUR PROFITS!

Inside drainage pipes is where they do their thieving—and it takes more than a makeshift grease trap to keep them from eventually clogging pipes and costing a tidy sum of money for time-wasting repair work. They'll put a stop to production, too, without warning. A Zurn Greaseptor provides adequate protection for commercial or industrial drainage lines. Drainpipes protected by the Zurn Greaseptor don't clog—because the Zurn Greaseptor intercepts, separates and recovers the grease from waste water before it can enter the level stretch of piping where grease usually collects, and leads to particularly difficult, costly and time-wasting repairs. Zurn V.G.E. Greaseptors are easier to install, easier to clean, and assure free flowing drainage at all times. Greaseptors come in three convenient sizes suitable for any size industrial or commercial kitchen: capacities, 25, 18 and 12 gallons per minute. A plumbing contractor or plumbing supply wholesaler can tell you about Greaseptors. Grease is a sneaky trouble-maker. Don't give it a chance! Mail coupon immediately.

ZURN J. A. ZURN MFG. CO. Sales Office and Factory, ERIE, PA.

V·G·E GREASEPTOR

What happens to unprotected pipe receiving greasy waste-water.



Zurn V.G.E. Greaseptors employ the efficient flotation principle, feature the exclusive new Flo-Trol which automatically controls rate of flow into intercepting chamber. Greaseptors are approved under War Department Specification for Theater of Operations (Modified) and Mobilization Construction Equipment, PE-620; also U. S. Army Corps of Engineers Tentative Specification PE-620, dated May, 1944.

ZURN V·G·E GREASEPTORS

J. A. ZURN MFG. CO., Dept. FI, Erie, Pa.
We are interested in avoiding drain troubles. Please send folder giving complete information on Zurn Greaseptors.

Name _____

Address _____

City _____ State _____

Please attach to your business letterhead. FORM NO. 44-82

To
EXECUTIVES • TECHNOLOGISTS
in the
FOOD INDUSTRIES
WITH PROBLEMS TO BE SOLVED

Have you a Food Equipment Development Problem which has been bothering you? If so, we believe that Artisan Metal Products Inc., an engineering and manufacturing firm, which has specialized for the past ten years in solving problems for both the Food and Chemical Process Industries, can be of assistance to you.

Artisan Engineers have a background and experience in Chemical and Mechanical Engineering which is of value to the Food Industry. They know how to get heat into, and out of, products quickly or slowly. Since heat flow, along with fluid flow, is the fundamental background for Heating Equipment of all types, evaporators, cooking, etc., Artisan's engineers can contribute materially in assisting your engineers by offering specialized experience in these important fields.

Most Food Processors who develop a new product or improve an "old stand-by" work out their ideas in the laboratory. Then the laboratory tries to assist the engineering department in developing the laboratory process to mass production. This is a slow phase in the development of any product and is the spot where Artisan engineers have helped many clients. *We believe we can help you, too.*

Artisan specializes in the design and manufacture of Pilot Plant Equipment for transforming the ideas of the laboratory to meet the problems of mass production. *Artisan is not too big to engineer a small piece of equipment carefully, to help your staff operate it, and to make changes in the equipment to meet changing requirements.*

If you believe Artisan Engineers can assist in solving your engineering and equipment problems, please write asking for an engineer to call.

ARTISAN METAL PRODUCTS INC.
13 Sullivan Square
Boston 29, Massachusetts

176A, June 12, superseding C.Q.D. 176, March 31. Dehydrated Sweet Potatoes, C.Q.D. 60E, May 15, superseding C.Q.D. 60D, January 27. Macaroni and Spaghetti, C.Q.D. 119C, June 15, superseding C.Q.D. 119B, August 12. Dehydrated Beets, C.Q.D. 72E, May 8, superseding C.Q.D. 72D, November 1, 1943. Dehydrated White Potatoes, C.Q.D. 59F, June 23, superseding C.Q.D. 59E, May 1. Smoked Hams, C.Q.D. 7E, July 10, amended July 28, superseding Amendment 1, July 21. Army Beef Processing, C.Q.D. 305, July 26. Chicken and Vegetables, C.Q.D. 303, July 20. Packing of Frozen Poultry for Overseas Shipment, C.Q.D. 193, June 29. Frozen Cured Ham, C.Q.D. 195, July 12. Pan-coated Confections, C.Q.D. 184, July 3. Canned Ham, C.Q.D. 190, July 2. Flavored Dessert Powder, prepared with gelatine, C.Q.D. 157A, July 11, superseding C.Q.D. 157, October, 1943, used in lieu of Fed. Spec. C-G-191a.

Canned Pork Sausage, C.Q.D. 98B, July 3, superseding C.Q.D. 98A, August 10. To be used in lieu of Fed. Spec. PP-S. Frozen Army Style Overseas Chicken, C.Q.D. 191, July 6. Flavored Powder Dessert Prepared with Starch, C.Q.D. 196, July 13. Meat and Beans, C.Q.D. 194. July 11. Imitation Vanilla Flavoring Tablets, C. Q. D. 56A, July 15, superseding C.Q.D. 56, July 1, 1942. Ground Meat and Spaghetti, C.Q.D. 192, July 15. Dehydrated Apricots, C.Q.D. 304, July 26. Dehydrated Prunes, C.Q.D. 306, July 28. Dehydrated Clingstone Peaches, C.Q.D. 182, July 22. Cocoa, C.Q.D. 316, July 29. Candy Bar, C.Q.D. 307, July 30. Ten-In-One Ration, C.Q.D. 140B, August 1, superseding C.Q.D. 140A. Ham and Lima Beans, C.Q.D. 301, July 30. Smoked Bacon, C.Q.D. 33D, July 29, superseding C.Q.D. 33C, January 25. Packaging and Packing for Overseas Shipment of Cereal Subsistence Items. C.Q.D. 160A, July 12, superseding C.Q.D. 160, November 15, 1943.

Another Food Standard Postponed for Duration

ICE CREAM standards will receive no further action by the Food and Drug Administration until after the war. This postponement was requested by the War Food Administration because of the need for restricting the cream available for ice cream manufacture.

The record made by F&DA beginning in 1942, made necessary a minimum of 12 percent butterfat in ice cream if a standard is fixed. Wartime products contain less fat than this. In announcing the postponement, F&DA indicates the expectation of a postwar return to the higher cream content, which would then justify, they forecast, a standard that was characteristic of prewar practice.

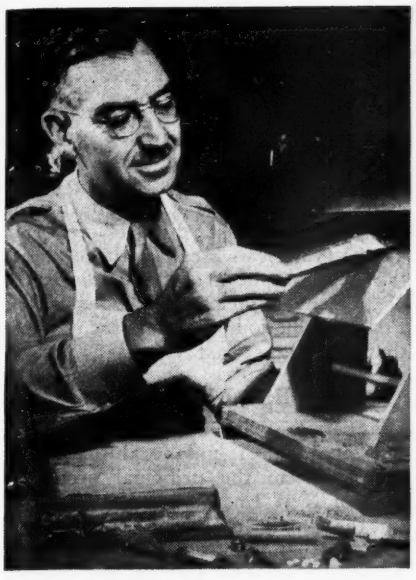
Salt Solution Data

BECAUSE of the many requests for information on the use of saturated salt solutions to control humidity in such spaces as small cabinets, the bureau of standards of the Department of Commerce has issued Letter Circular 752, "Control of Humidity by Saturated Salt Solutions."

A table accompanying the circular gives the relative humidity of air in equilibrium over saturated solutions of various salts, at temperatures that may be desired. In most cases the change in solubility with change in temperature is very large.

Candy Wants To Be A Well Balanced Food

CANDY MAKERS wish to have their product recognized as something more than a pleasant tasty confection. They are undertaking to develop their product so that it will be recognized as a food of high value, not only for energy yielding,



ACCESSORY PACKET

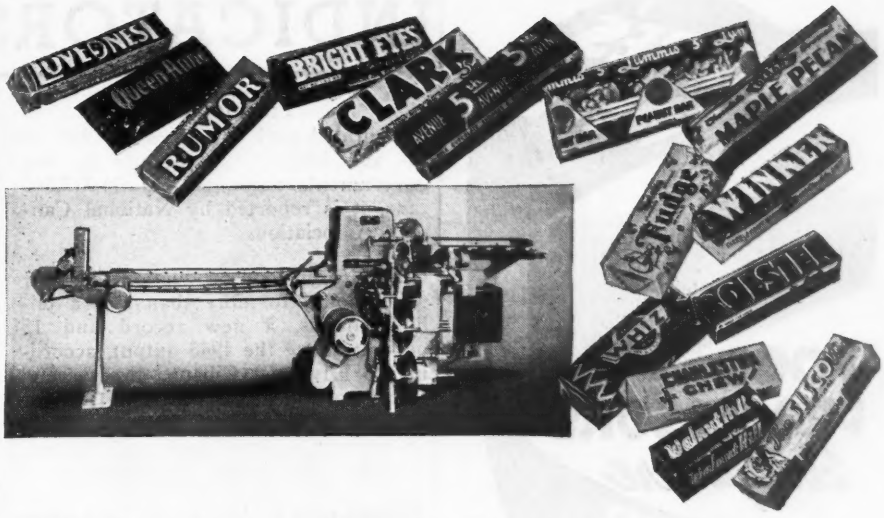
Maj. James D'A Clark, of the Chicago Quartermaster Depot, shows how special electric sealing equipment closes the new "C" Ration packet, which he is responsible for developing. The packet holds cigarettes, gum, toilet tissue, water purification tablets and a small folding tool-steel can opener. It is added to contents of one packet per case of 48 cans of Ration "C."

but also because of its balanced nutritive values. Thus, they hope, they will have more than a slogan in the statement, "Candy is a Food."

To support this effort National Confectioners' Association is supporting a research program in cooperation with the Bureau of Agricultural and Industrial Chemistry of the Department of Agriculture. Experimental work is first being done on fruit products for the more extensive use of these and a number of other agricultural materials. Among the other materials being considered are cotton-seed flour, peanut flour, low-fat soy flour, and various other carriers of proteins. The full extent of the investigations has not yet been determined.

These candy makers realize that they must not sacrifice the idea that their product is a confection, something to be eaten because folks like it. But they believe that it can also be a better balanced foodstuff and that it can carry vitamins, minerals, and other nutrients without losing its major sales appeal.

Producers of raw materials wishing to promote their products can anticipate here a large new market if they are successful in demonstrating their place in the candymaking program of the nation. But each materials supplier has an important job to do if he is going to make his goods useable. For example, some of the special flour makers have fallen down thus far because their product was too coarse and hence gave a granular feel on the tongue to the candy in which it was used. Serious development work on materials, as well as research on candy making, is therefore being planned by the confectioners.



This is what happens when you build a better machine

You'll find that successful manufacturers are quick to adopt improved machinery. This is particularly true of wrapping machinery that produces a better selling package.

Our Model DF is a good example. Here's a machine that solved a very difficult problem for confectionery manufacturers—the wrapping of irregular-shaped candy bars.

This machine turns out a smooth, box-like wrap, no matter how uneven the surfaces of the bar may be. The wrapping, being free from irregularities and ugly creases, has noticeably finer appearance, and provides more effective name display. Candy men immediately saw the sales value of such superior wrapping. DFs went into plant after plant. Today, like so many other models in our line, the DF is the most widely used machine in its particular field.

In other fields too, our machines likewise wrap the bulk of all the leading packaged products—a fact worth remembering in considering *postwar wrapping equipment.* We're ready to study this subject with you now in order to give you the latest and the best in the shortest possible time.

Write for our new book "Sales Winning Packages and the machines that produce them".

PACKAGE MACHINERY COMPANY • Springfield 7, Massachusetts

30 Church St., New York 7 • 111 W. Washington St., Chicago 2

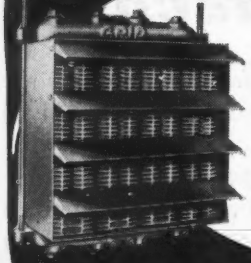
101 W. Prospect Ave., Cleveland 15 • 443 S. San Pedro St., Los Angeles 13 • 32 Front St., W., Toronto 1

PACKAGE MACHINERY COMPANY

Over a Quarter Billion Packages per day are wrapped on our Machines

HERE'S WHY-

FOOD PROCESSORS Everywhere PREFER GRID UNIT HEATERS



- One piece construction heating sections (patented) of high test cast iron that withstand steam pressures up to 250 lbs.
- No soldered, brazed, welded or expanded connections to become loose or develop leaks.
- No electrolysis to cause corrosion, breakdowns, leaks, or heating failures.

HIGH TEST CAST IRON HEATING-SECTIONS that STAND 250 LBS. STEAM PRESSURE

As one large food processing plant reports after 10 years' operation, "We find that GRID Unit Heaters are better than other types in corrosive atmospheres". That's because GRID Unit Heaters are built to last, to stand wear as long as the pipes furnishing steam to them. Install GRID Unit Heaters for permanency. Complete data and capacity tables upon request.

BLAST SECTIONS

The same high efficiency and lasting qualities as GRID Unit Heaters . . . one piece construction "fin" sections of high test cast iron . . . no tortuous air passages . . . complete absence of ruptures, strains, and warping. Guaranteed for steam pressures up to 250 lbs. Complete information upon request.

D. J. MURRAY MANUFACTURING CO. WAUSAU, WISCONSIN

GRID

INDICATORS

Production

Dehydrated pork produced in 1943, in 15- and 16-oz. cans for use by the government, amounted to 11,712,346 cans, it is reported by National Canners Association.

Quick frozen food production this year will amount to more than half a billion pounds, a new record and 15 percent above the 1943 output, according to Edwin T. Gibson, director and former president of National Association of Frozen Food Packers. About 85 percent of this pack will become available for civilian consumption.

Canned tuna packed in the first seven months of 1944 totaled 1,522 920 cases compared with 1,047,294 during the first seven months of 1943, the Office of the Coordinator of Fisheries reports.

Canned asparagus packed this year totaled 3,832,604 cases compared with the 1943 pack of 3,558,487 cases. This year's pack includes 2,522,866 cases of all green asparagus and 1,309,738 cases of white, National Canners Association reports.

Flour production during August showed an increase of 828,009 sacks as compared with August, 1943, production, according to *The Northwestern Miller*. Total production in August was 14,485,300 sacks representing 73 percent of the total output of the United States. The figure for the same month a year ago was 13,657,291 sacks, representing 70 percent of the output.

Canned sweet corn production in 1944 will fall below the output last year by approximately 30 percent, according to a mid-season estimate by Corn Canners Service Bureau. The average quality also appears to be below normal, primarily because of delayed planting schedules and high temperatures at pollination time.

Alaska salmon canned this season will total 4,900,000 cases, the Office of the Coordinator of Fisheries estimates. This will be about half a million cases less than last year and slightly less than the output in 1942.

Creamery butter production for the first 31 weeks of this year was 987,200,000 lb., only 88 percent of the output for the same period of 1943.

Beef and veal produced in Federally inspected plants set a record for the month of August. Figures reported by the American Meat Institute placed the beef output at 600,000,000 lb., or 21 percent higher than August, 1943. Pork production was 19 percent lower than in August last year.

Raw Materials

Cranberries will be less plentiful this fall because of unfavorable weather conditions in the principal producing area of New England. Production will be the smallest since 1921, being 35 percent below production last year, according to estimates by the Department of Agriculture.

Grape production in California this year was estimated at 2,492,000 tons in an August 1 forecast by the California Crop and Livestock Reporting Service. By variety, the 1944 production is as follows: wine, 548,000 tons; table 494,000 tons; grape, 1,450,000 tons.

Apples produced commercially this year are expected to total slightly more than 125,600,000 bu., an increase of approximately 41 percent over last year.

Turkey production this year will set a record of 35,666,000 birds, 8 percent more than last year and 4 percent above the previous record in 1940.

Hops grown in the major producing states of Washington, Oregon and California will yield an estimated 46,765,000 lb. this year, compared with 42,302,000 lb. in 1943. If exports are the same as last year, production will be sufficient to meet the needs of the American brewing industry.

Fats and oils supplied in 1944-45 may be 700 000,000 lb. less than in 1943-44. Production from domestic materials is expected to drop from the 1943-44 level of 11,300,000,000 lb. to around 10,000,000,000 lb., and no major increase in imports is indicated.

CHANGE OF ADDRESS

McGRAW-HILL PUBLISHING COMPANY
330 West 42nd Street, New York 18, N. Y.
Director of Circulation:

Please change my address on "Food Industries"

From .....

.....

To .....

.....

Signed .....

CONSTRUCTION NEWS

	Pending (thousands)	Awarded September (thousands)	Total Awarded 1944 (thousands)
Bakery	$ 50	.....	$ 260
Beverages	815	$ 40	120
Canning and Preserving	100	.....	360
Cold Storage	623	140	1,492
Confectionery	.....	.....	50
Grain Mill Products	1,152	40	1,420
Ice Manufactured	.....	.....	40
Meats and Meat Products	40	.....	825
Milk Products	950	307	2,011
Miscellaneous	990	305	1,874
	$4,720	$ 832	$8,452

In Storage

The cold storage situation on September 1 was "less critical" than a month earlier, WFA reports. Cooler occupancy was down 3 points, while freezer occupancy was unchanged.

Fresh foods in cold storage on September 1 included 246,000 bu. of apples, 3,921,000 bu. of pears and 39,869,000 lb. of other fresh fruits and vegetables. Apple holdings were 25,000 bu. heavier than on September 1 last year, while pear storage went up 2,199,000 bu.

Frozen fruits and vegetables in storage increased 38,090,000 lb. in August. This was a third less than the increase during the same month a year ago. Holdings of frozen fruits were 62,200,000 lb. greater than at the same time in 1943, while frozen vegetable stocks were 20,200,000 lb. heavier.

American cheese held in cold storage on September 1 totaled 186,396,000 lb., compared with 190,804,000 lb. a month earlier and 172,937,000 lb. a year ago.

Dried whole eggs in cold storage amounted to 108,688,000 lb. on September 1 against 95,728,000 lb. a month earlier. Dried egg yolks in storage totaled 509,000 lb. on September 1 as compared with 598,000 lb. on August 1.

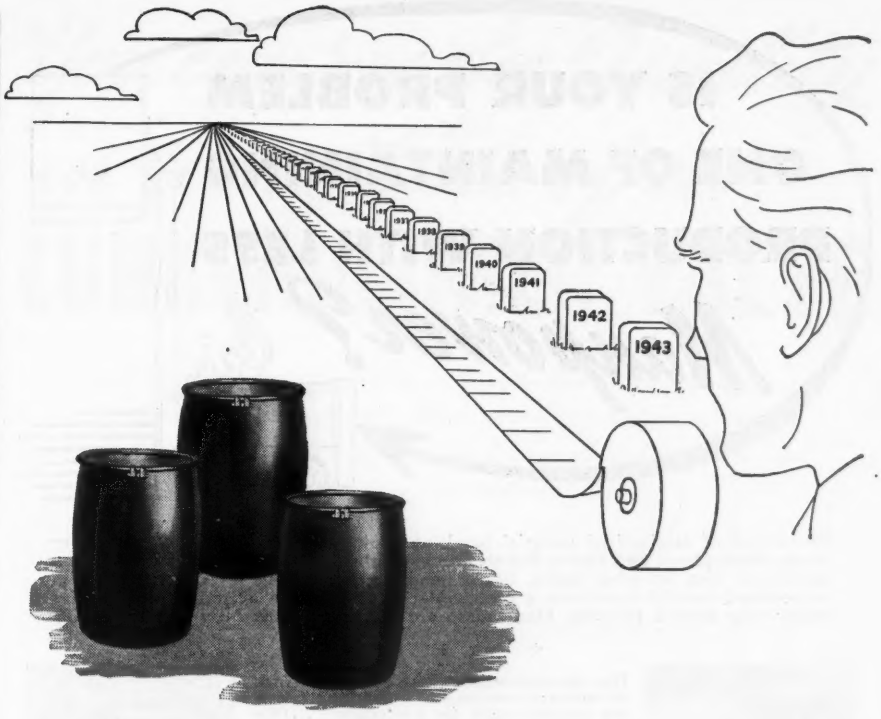
Frozen poultry held in refrigerated warehouses amounted to 160,002,000 lb. on September 1, up appreciably from the 141,654,000 lb. figure of August 1. On September 1, 1943, holdings were 55,315,000 lb.

Indexes

Business activity index of *Business Week* stood at 232.3 on September 9, compared with 235.2 a month earlier and 240.7 a year ago.

Wholesale commodity price index for foods compiled by Irving Fisher was 120.1 on September 15, as against 120.4 on August 25, and 119.1 a year ago.

Cost of living index of National Industrial Conference Board was 105.1 in August, as compared with 105.0 in July and 102.5 a year ago.



CAN YOU MEASURE CONTAINER UNIFORMITY IN YEARS OF EXTRA SERVICE?

THE ability of Hackney light weight containers to meet the requirements set for them and, then, to continue giving extra service, is due in no small part to their uniform size, weight, strength and capacity. Extra service is designed into them by competent engineers. And it is maintained by Pressed Steel Tank Company's more than 40 years of volume production experience.

Starting with the chemical and metallurgical research that is used in the testing of material, and continued by the modern heat-treating and quality control equipment, uniformity is assured in every manufacturing step, from raw material to finished product.

Because Hackney Barrels and Drums uniformly have construction features which enable easy, thorough cleaning, facilitate fast, low-cost handling, and assure protection to the contents while in transit or in storage—these Pressed Steel Tank Company products are preferred by the industry to which they give so many years of *extra service.*

Write today for full information

Pressed Steel Tank Company

MANUFACTURERS OF HACKNEY PRODUCTS

General Offices and Factory • 1457 SOUTH 66th ST.

Milwaukee 14, Wisconsin

CONTAINERS FOR GASES, LIQUIDS AND SOLIDS

IS YOUR PROBLEM ONE OF MAINTAINING PRODUCTION WITH LESS *Manpower?*

Proper use of mechanized material handling equipment can help offset manpower losses. Most plants find that a Baker Truck—with a single operator, will release a number of men for other duties. Faster handling of materials speeds production in other ways, too. If you have a manpower problem, the actual case histories below may offer a solution. Many more are reported in the New Baker Catalog.

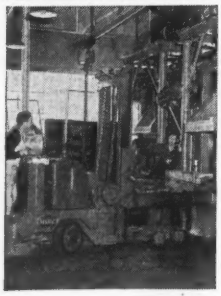
★ ★ ★ ★ ★

One company writes "With our Baker Truck we increased storage area by stacking, releasing valuable space for production . . . We were able to save the labor of six men and speed movement from receiving platform to storage—saving elevator tie-up . . . we removed the ever-present danger of strains and hernias." (See illustration at left.)

Records show that one of the first ram trucks, introduced by Baker in 1922, realized savings of 35 man hours per carloading for a steel mill. Today ram trucks are standard equipment for handling coiled materials. Illustration at right shows one of a fleet of Baker Trucks in the world's largest, most modern stainless mill.

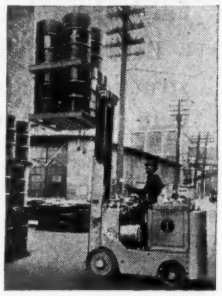
"Womanpower" has replaced lost manpower and helped maintain production in thousands of plants. Because of their extreme ease of handling, Baker Trucks are ideal for women operators. Illustration at left shows a truck in service at a plant of the world's largest aluminum producer.

A fleet of eight Baker Trucks keeps the plant of a large domestic range manufacturer—now engaged in turning out war goods—at top production. Trucks service machines with materials to keep them running without interruption. Faster movement of parts and products in plant, warehouse and on loading platforms has cut handling costs 75%. (See illustration at right.)



An important factor in maintaining production in a large aircraft plant is the minimizing of "down-time" of large presses. The Baker Die Handling Hy-Lift Truck makes quick work of removing or placing dies in position—and simplifies their storage. (See illustration at left.) This plant also uses Baker Crane Trucks for speeding operations on the assembly line.

The problem of handling efficiently the wide variety of materials at a large chemical manufacturing plant is solved by a fleet of Baker Fork Trucks. (See illustration at right.) In carloading operations alone, on a conservative estimate, one Baker Truck replaces seven men with hand trucks.



WRITE FOR YOUR COPY

Plant and production managers, traffic managers, superintendents, purchasing agents and any others concerned with material handling will find the new Baker Catalog No. 52 a valuable reference.

BAKER INDUSTRIAL TRUCK DIVISION *of The Baker-Raulang Company*

2146 WEST 25th STREET • CLEVELAND, OHIO

In Canada: Railway and Power Engineering Corporation, Ltd.

Baker INDUSTRIAL TRUCKS

WPB Orders

Refrigeration—While the basic restrictions of L-38 remain unchanged, the provisions governing the production and sale of industrial and commercial refrigeration and air conditioning equipment have been modified. They now give greater flexibility and provide for better distribution among the most essential users. A schedule of production quotas has been included in the amendment and the four lists of essential users eliminated.

Processing Machinery—As the result of an amendment to the limitation order, manufacturers who want to make food processing machinery in quantities greater than permitted by L-292, may now apply for this permission under the provisions of Priorities Regulation 25.

Vitamin C—Allocation control of vitamin C has been transferred to M-300, while M-269, governing this vitamin, has been revoked. Purchase of vitamin C in quantities as large as 30 kilograms may now be made without application to WPB. Heretofore, the maximum quantity was three kilograms.

Fiber Containers—An amendment to Direction 2 to M-290 permits the manufacture of solid fiber freezer boxes for packing butter, meat and fish, without the specific WPB authorization. The amendment, issued as Schedule A, also raises "W" boxes, a lighter weight box made of corrugated fiberboard, to the level of "V" boxes.

Lactic Acid—Allocation control of lactic acid is established by Schedule 43 of M-300, the general chemicals order, effective September 1. This action had to be taken because the enlarged military uses for lactic acid are expected to require approximately 40 percent of the total production.

WFA Orders

Dried Milk—All restrictions on the use of nonfat dried milk solids in the manufacture of bread are removed by an amendment to WFO 1. WFA also announced the cancellation of the 35 percent September set-aside for roller nonfat dry milk solids, and declared that it may not be necessary to require any set-aside during the coming months of low production.

Dried Fruits—The set-aside provisions covering dried apples, apricots, peaches, pears, prunes, raisins and Zante currants are extended through the 1944-45 season by an amendment to WFO 16. The provisions are essentially the same as those in effect during the previous year.

Pork—Certain cuts of pork are brought under set-aside regulations by WFO

75.3, effective August 27. These requirements range from 6 percent on frozen pork sides to 70 percent on shoulder cuts.

Salmon—Amendment 5 to WFO 44 increases from 60 to 70 percent the quantity of canned red, cohoe and pink salmon that is to be reserved from the current pack for delivery to government agencies. The chum salmon percentage is increased from 40 to 70 percent. Canned salmon already tendered to government agencies or sold, or entitled to be sold, to civilians, under Amendment 3 of the order, are exempt from the increased percentages.

Pickles—The cucumber pickle reservation for government purchase is increased from 25 to 40 percent by an amendment to WFO 101, effective August 17. Transactions completed prior to the effective date of the amendment are valid as made, under the provisions of the order.

Soybeans—In order to assure maximum production of soybean oil and oil meal during 1944-45 soybean marketing season, processors, manufacturers and seed dealers are prohibited from purchasing or accepting delivery of 1944 crop soybeans in a quantity greater than his processing, manufacturing or sales requirements for the period ending Oct. 10, 1945.

Canned Fruits—An amendment to WFO 22-6, effective September 3, increases the set-aside of the following seven canned items: apples, from 65 to 66 percent; applesauce, from 23 to 27 percent; fruit cocktail, from 75 to 78 percent; peaches, from 74 to 76 percent; pears, from 78 to 80 percent; pineapple, from 60 to 61 percent; pineapple juice, from 64 to 66 percent.

Yeast—Manufacturers who own active dry yeast, or have it in their possession, and manufacturers who, after September 16, produce active dry yeast are required to set aside the entire amount, by WFO 112. This action, however, does not affect other types of yeast or yeast products.

OPA Orders

Dairy Products—Primary distributors whose registrations with OPA include places where rationed dairy products —90 percent of which have been produced, processed or imported at another of his establishments—are kept for sale, may consolidate their monthly reports on Dairy Products Report 1, as a result of Amendment 22 to PRO 16, effective September 22.

Sugar—Industrial users of sugar will get the same allotments in the fourth quarter, beginning October 1, as was granted in the third quarter. For all food manufacturers, this means an allotment of 80 percent of the sugar the user consumed in the corresponding 1941 period.

You can see the Quality in every line of a

LUNKENHEIMER VALVE

From handwheel to pipe threads a Lunkenheimer Valve reflects exceptional strength and ruggedness. Ample proportions and perfect balance of all parts are basic design features that give assurance of the good service and long life so characteristic of Lunkenheimer Valves.

Maintenance men have long since come to depend upon Lunkenheimer for the best in valve service . . . knowing they will get the highest degree of performance with the least amount of trouble and maintenance expense.

•

Lunkenheimer distributors are located in all industrial centers. Use the facilities of the one nearest you for service on your requirements.

ESTABLISHED 1862
THE LUNKENHEIMER CO.
"QUALITY"
CINCINNATI 14, OHIO, U. S. A.
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BOSTON 10 PHILADELPHIA 7
EXPORT DEPT. 318-322 HUDSON ST., NEW YORK 13, N. Y.
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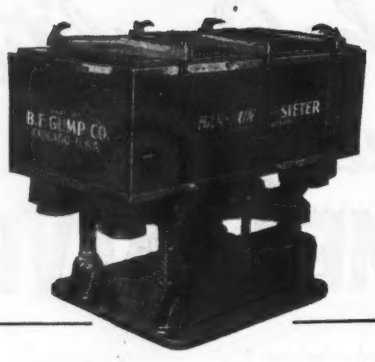
LUNKENHEIMER
N-M-D
Only experience and "know-how" can make a casting like this; and only such a casting can make a Lunkenheimer Valve.
SIMPLICITY OF DESIGN MEANS EASIER MAINTENANCE



BAR-NUN
ROTARY
SIFTERS

Tops in Sifting Efficiency

GENERALLY considered tops in sifting efficiency in vital war plants where they have been doing heavy, 24 hour duty. Invariably additional units have been ordered whenever greater sifting capacity was required. These sturdy, compact, self-contained machines crowd more sifting capacity into less floor space than you ever thought possible. Offers complete Rotary Motion . . . mechanically controlled. Does an extremely thorough job on single or multiple separations. Precision-built of finest materials for years of economical, trouble-free service.

MADE BY:

B. F. Gump Co

Established 1872

454 SO. CLINTON STREET
CHICAGO, ILL.

MAKERS OF: Equipment for Grinding, Mixing, Sifting, Weighing or Packing of Food Products.

★

Rice—A rice miller's "toll milling" or "custom milling" service is limited to the amount of such services he rendered between April 1, 1941, and April 1, 1942, by Second Rev. 150, effective September 11.

Processors' Prices—Processors' ceiling prices for the 1944 pack of canned fruits and vegetables are based on each processor's selling price during the first 60 days of 1941, a permitted increase for specified items in given areas and a price range. The regulations are issued as amendments to Supplement 7 to FPR 1. The formula for canned peas is issued under Amendment 2, effective August 19; for canned tomatoes, under Amendment 8, effective September 5; canned sweet cherries, under Amendment 4, effective August 28; packed snap beans, under Amendment 6, effective August 30; yellow cling peaches produced in California, under Amendment 5, effective August 29.

Protests—Amendment 6 to Procedural Regulation 6, effective September 4, eliminates the 60-day time limit in which protests could be filed against the denial of an application for an adjustment of maximum prices. No specific time limit now exists, but where the filing is unduly delayed, the delay may be used as a defense by OPA. The agency says that it will normally regard 90 days or more as unreasonable delay.

Bread—Where producers have increased the size of their breads or the weight of a sales unit of rolls, they may add 1 cent to their present maximum prices for day-old, stale or broken bread or rolls under Rev. Supp. Reg. 14B.

CAPITAL VIEWS

FAD OR TREND—Cooperation in industrial research for a whole industry has been widely recognized as important by many divisions of the food business. Lately, the textile industries have been taking up this idea in rather an unusual fashion. At least a half-dozen important educational or other independent institutions have been drawn into such programs by textile companies. Some of these are given substantial endowments. Others are merely working with funds subscribed by the individual companies.

It is quite likely that a similar plan of organization may serve some of the highly specialized needs of certain divisions of the food industries. These textile programs will be studied with interest by food research executives in order to find out where they offer special merit and how they develop limitations. It is evident from the beginning that they will neither supersede individual company expenditures for their own research departments nor take the place of the research organized by trade associations. They do, however, offer interesting possibilities and deserve study, and perhaps imitation.

TAX CUT PROMISES—Every faction of both major political parties would like to appear as the bearer of good news regarding cuts in both industrial and individual taxes as soon as the European fighting is over. However, budgets for Uncle Sam's activities next fiscal year contemplate the need for at least $25 billion in taxes. That is only half what Uncle Sam has collected in taxes this year. But it may represent about what present tax rates will collect on activities of much smaller size when war cutbacks and unemployment become common. It is not safe to plan any fiscal program for any food establishment on the assumption of lowered tax rates for a year or two to come.

IT'S NOW FAO—The new agency for international planning in the food business is now called Food and Agriculture Organization of the United Nations. This body has been proposed to Washington by the Interim Commission on Food and Agriculture. It is not proposed completely to supersede UNRRA, theoretically. But practically, it will be the top planning agency. Actually, the relief function

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of UNRRA is likely to be largely taken away from it by the Army's desire to do relief work in areas released from Nazi control. Although UNRRA is on the way out, so far as usefulness is concerned, it continues to have its top officers and staffs and maintains a great "front" of importance.

CROP GOALS IN 1945—War Food Administration has wanted to postpone as long as possible any intimation of the crop goals that will be fixed for next year. When they are announced, these goals will reveal indirectly where surpluses of processed food exist. If the Army turns back for civilian use huge quantities of various kinds of goods, it will, of course, make WFA very reluctant to encourage new farm production next year for those same classes of commodities. The military secrecy which covers up facts about surplus stocks will be relaxed and WFA can talk freely as soon as the European war situation proceeds just a little further.

WHEAT SURPLUS—The tremendous carry-over of wheat expected next spring is not being concealed at all. Already it is evident that there will be an all-time record supply of that grain, irrespective of the number of people released from enemy domination who may temporarily need to be fed. Those who remember the consequences of the wheat surplus 25 years ago already have begun to worry about the large general impact on American economy, especially American agriculture. The food industries must begin to think about what Uncle Sam may do to subsidize the use of wheat in the United States. Just suppose, for example, that it were made the basis of a subsidized sweetener business competing with corn.

PHOSPHATE FEED — Processed bone as a phosphate feed for stock is being superseded by phosphatic materials made from phosphate rock with elimination of the objectionable fluorine. Those interested in any phase of food-byproduct sale for feed purposes must watch this development. It has the blessing of the Department of Agriculture and active participation of at least six important industrial establishments which are now turning out defluorinated rock of a quality safe for feed.

RESALE OF SURPLUS — Anyone who buys surplus commodities from the government must meet certain price ceilings set by OPA on resale of those goods. This insures the public against the major threat of profiteers dealing in government surplus goods. It does not protect other manufacturers against severe competition. There is no floor price under these goods. They may sell very cheap. They may, probably will, embarrass some regular marketers of comparable goods before the job of disposal is done.

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Even though we may not be able to ship to any but established users at present, we can supply Monsanto Sodium Benzoate, either in flakes or as powder, in quantities sufficient for your postwar development work. For complete information, please contact the nearest Monsanto office or write: MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, 1700 South Second Street, St. Louis, 4, Missouri. District Offices: New York, Chicago, Boston, Detroit, Charlotte, Birmingham, Los Angeles, San Francisco, Seattle, Montreal, Toronto.

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* * * * * * *

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General American Process Equipment is a consolidation of four outstanding process equipment manufacturers, each a well-known specialist in its field, now welded together to serve you with one organization, one responsibility and one high standard of performance.

This Division is also closely associated with the Plate and Welding Division of General American Transportation Corp. at Sharon, Pa.

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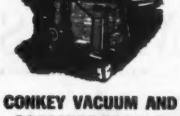
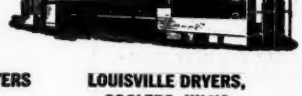
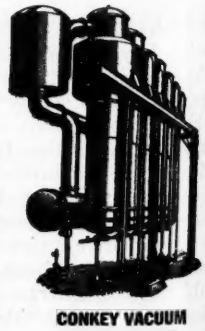


CONKEY VACUUM AND PRESSURE FILTERS

AMERICAN DRUM DRYERS AND FLAKERS



LOUISVILLE DRYERS, COOLERS, KILNS



CONKEY VACUUM EVAPORATORS

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INDUSTRY

Bisceglia Brothers Wine Co., Fresno, Calif., will construct a 4,000,000- to 5,000,000-gal. distillery and winery at a cost of about $300,000. Construction of the all-concrete building is expected to begin in December.

Bergjans Dairy Co., St. Louis, Mo., has been purchased by Arnold Peggemoeller, owner of the Crown Point Dairy Co., for about $50,000.

Fishery Products, Inc., announces the closing of its Boston office and the opening of a new office in Cleveland, Ohio.

Harlington Canning Co., Harlington, Tex., is adding a new $40,000 warehouse close to its present canning plant.

Lutz Canning Co., Westfield, Ind., was recently destroyed by fire with a loss of $40,000. Operations have been transferred to a company plant in Pendleton, Ind.

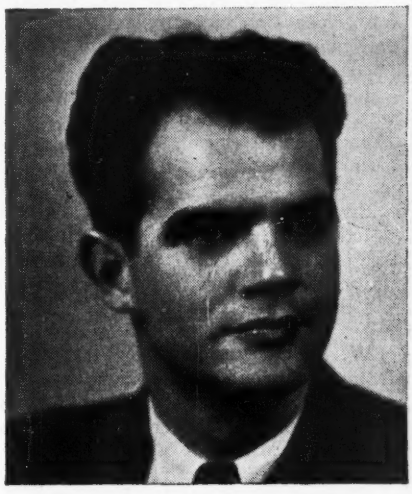
Mid-Continent Food Products is being established in Chicago, bringing a new name to the frozen egg industry, according to an announcement by Jay G. Odell, formerly of the Seymour Packing Co. Plans are being made to start packing frozen eggs next spring.

Pacific Coast Dehydrated Products Co., Modesto, Calif., was completely destroyed by fire, August 16, with a loss of approximately $200,000. While the buildings and machinery were covered by insurance, the company expects the present-day replacement costs to exceed the coverage considerably.

Pecos Valley Foods Co., Roswell, N. M., has received WPB approval to build a cannery. It will be designed to pack tomatoes and other vegetables.

Pepsi-Cola Co.'s postwar headquarters for the 11 western states will be located in Oakland, Calif., according to a recent announcement. Plans are being made to build a streamlined sirup manufacturing plant, costing close to $50,000, in the Oakland area. The new plant will supply sirup to about 100 bottling plants in the far west.

Universal Match Corp., St. Louis, has bought the controlling interest in the Schutter Candy Co., Chicago, for a price indicated to be in excess of $2,000,000. Manufacture of 5-cent candy bars will continue at the Schutter plant, and no replacement of Schutter executives is anticipated. This is the second candy company to be acquired by Universal. In 1939, the corporation bought all the outstanding stock of the Candy Brothers Manufacturing Co., St. Louis.



DR. E. A. BEAVENS

Newly appointed as chemist in charge of the laboratory of fruit and vegetable chemistry, Bureau of Agricultural and Industrial Chemistry, Department of Agriculture, Los Angeles, Dr. E. A. Beavens will direct research and processing work on fruits, vegetables and other agricultural products of the West, with special emphasis to be placed on frozen packs.

Visalia Dehydrating Co., Exeter, Calif., completed its new plant in time for the Thompson Seedless grape harvest. Its capacity is estimated at 130 fresh tons per day of fruits or vegetables.

FREDERIC G. BERNER

Named chief administrative assistant to Clarence Mark, president of G. Washington Coffee Refining Co., Frederic G. Berner moves to the Morris Plains, N. J., headquarters of the company, from the New York offices of Harold H. Clapp, Inc. He was formerly chief of coffee rationing at OPA.

DR. H. S. PAINE

Formerly head of the Carbohydrate Division, Department of Agriculture, Dr. H. S. Paine, has joined the technical staff of Refined Syrups and Sugars, Inc., Yonkers, N. Y., as research consultant. Dr. Paine was with the department 25 years. In his new capacity, he will direct research in the fields of candy, baking, ice cream, brewing, soft drinks and preserving.

PERSONNEL

Roy A. Asmussen has been appointed midwestern district manager of Sardik Food Products Corp., New York. His headquarters will be in Chicago.

Dr. Ernest Bechtel, formerly associate professor of dairy husbandry at Kansas College, Manhattan, Kan., has been appointed assistant director of research of the Larrowe Division of General Mills, Detroit.

Dr. Frank M. Boyles has joined Joseph Burnett Co. as chief chemist and superintendent of manufacturing processes. Dr. Boyles is widely known as a chemist of many years' affiliation with the flavoring extract and allied industries. He took up his new duties in August.

Raymond Eves has been appointed manager of grocery products sales for Pillsbury Flour Mills Co., Detroit. He succeeds George M. Millar, who has been named assistant to R. C. Painter, manager of the New York and Philadelphia divisions, grocery products sales. Mr. Eves was formerly representative in the Grand Rapids territory.

William Ralph Fish, who recently received a Ph.D. degree in agricultural biochemistry at the Pennsylvania State College, has joined the research staff of Swift & Co., Chicago.

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Arthur K. Fisher has joined the staff of the Food Price Division as head of the Specialties and Imports Section of the Office of Price Administration. Mr. Fisher was associated with the John F. Jelke Co., Chicago, for 27 years as vice-president and general manager.

J. R. Fleming, of Weatherford, Tex., was elected president of the National Pecan Shellers and Processors Association recently.

Edwin Funk, formerly with the National Oil Products Co., Harrison, N. J., has been appointed sales promotion and advertising manager for the Sheffield Farms Co., Inc.

W. D. Hughes has been transferred from the Toledo to the Carthage, Mo., plant of the National Biscuit Co. He will serve as manager at the former McDaniel Milling Co. plant.

Edward F. Kapalka has been appointed research chemist for J. E. Siebel Sons Co., Technical Service Division of Siebel Institute of Technology, Chicago. Mr. Kapalka formerly was research chemist with the Chas. Freihofer Baking Co., Troy, N. Y., and cereal chemist and bacteriologist for the General Baking Co., New York City.

J. A. Keenan, formerly director of nutritional research for Carnation Co., Milwaukee, Wis., is now executive vice-president of Standard Cap & Steel Corp., Chicago.

Capt. Mack E. Kittay has been made manager of the Southern Division of National Starch Products, Inc. His headquarters will be in Houston, Tex.

Gravin Neil has been appointed general manager of the Buffalo plant of Hygrade Food Products Corp. to succeed Joseph H. Keller, who is being promoted to a new post with the company. Mr. Neil had been assistant general manager of the Buffalo plant.

Lee A. Taylor has resigned as secretary of the Association of New York State Canners to join National Canners Association, as secretary of the planning committee. Mr. Taylor has been associated with the New York state group for the past six years.

R. B. Thomas has been appointed vice-president and chief administrative and executive assistant to H. W. Roden, president of American Home Foods, Inc. Mr. Thomas comes to the New York City headquarters of the company from Rochester, N. Y., where he was vice-president in charge of production for Harold H. Clapp, Inc., an American Home Foods affiliate.

John Van Dolah, formerly director of research for Wander Co., Chicago, became director of nutritional research for Carnation Co., Milwaukee, Wis., on September 19.

FRANK HAZEN

While preparing to leave home for his office, Frank Hazen died suddenly of a heart attack on August 28. For the past five years Mr. Hazen has been manager of the Minneapolis bakery of the Loose-Wiles Baking Co., where he started as a clerk 36 years ago.

DEATHS

John M. Colony, 58, a pioneer in the development and manufacture of homogenizers, Sept. 5, at Boston.

William W. Craford, 65, president of the Emmart Packing Co., Aug. 24, in Louisville, Ky.

Frederick A. Flood, 78, former partner in Chase & Sanborn Co., Sept. 6, at Boston. Mr. Flood joined Chase & Sanborn in 1892 and remained with them until his retirement in 1942.

Prof. Edward Franklin Gaines, 68, at Colfax, Wash., Aug. 17. Professor Gaines was well known for his research work in the field of wheat development while at Washington State College, Pullman.

G. Adrian Heyboer, 60, president of the Holland-American Wafer Co., Grand Rapids, Mich., Aug. 2, in Grand Rapids.

Charles G. Lange, 84, a founder of the Lange Canning Co., recently in Eau Claire, Wis.

Harry G. Richard, a director and vice-president of California Packing Corp., in charge of the company's dried fruit department operations, recently, in San Francisco.

Frank E. Wilhelm, 60, first vice-president of the Cudahy Packing Co., Aug. 29, en route from Chicago to his home in nearby Lake Bluff.

Arthur H. Purdy, managing director of General Ice Cream Corp's. Western division, 1942 president of the New York State Association of Ice Cream Manufacturers, September 18, in Buffalo.

ASSOCIATED INDUSTRIES

Allis-Chalmers Manufacturing Co., Milwaukee, recently named Albert M. Marsh as the food industries representative for the company.

Fairbanks, Morse & Co. is reputed to be the world's largest manufacturer of turbine pumps, as a result of its recent purchase of the Pomona Pump Co., with plants in St. Louis, Mo., and Pomona, Calif.

F. G. Findley Co., Milwaukee, manufacturer of industrial adhesives, announces the appointment of E. G. Armstrong as representative in Michigan. Mr. Armstrong has been with the Findley Co. for the past year and was formerly with Kroger.

W. E. Fisher has been advanced from vice-president to president of the Anchor-Hocking Glass Corp., Lancaster, Pa. I. S. Collins becomes chairman of the board.

Food Machinery Corp.'s fourth Army-Navy "E" award was presented to the Peerless Pump Division, Los Angeles, Calif., recently. Other plants of the firm which have received the award are in Riverside, Calif.; Lakeland, Fla., and Hoopeston, Ill. The corporation also announces the establishment of an engineering research department in Los Angeles, under the direction of G. C. Paxton, engineer in charge, and Lloyd Jones, field research engineer.

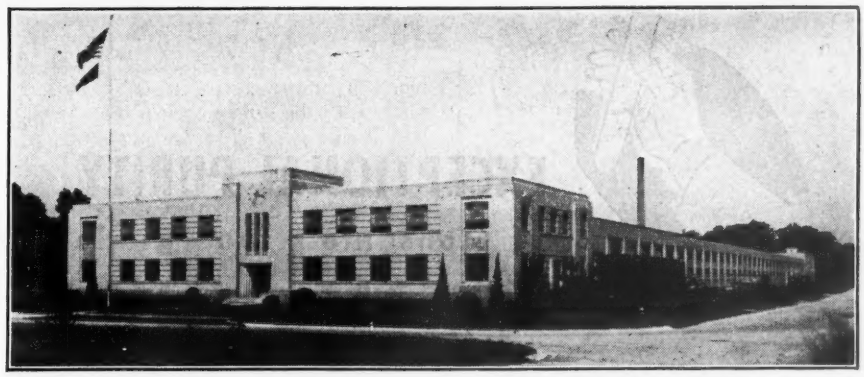
L. T. Dupree, formerly with Servel, Inc., Boston, has joined the staff of Arthur D. Little, Inc., industrial chemists, Cambridge, Mass.

Jenkins Bros., valve manufacturer, has been officially honored for the fourth time by the United States Maritime Commission. The company may now fly three gold stars on the original "M" pennant.

Mechanical Handling Systems, Inc., Detroit, Mich., has opened a new office in Philadelphia. J. F. O'Hara is manager.

Milton Roy Pumps, Philadelphia, recently announced the following appointments: W. K. Sims, for the northern New Jersey territory; Geo. P. Schumacker, for Cleveland and northeastern Ohio territory; J. J. Heinrikson, for Omaha, Neb., western Missouri, and all of Kansas; Charles Holz, for the West Virginia territory.

Thatcher Manufacturing Co., Elmira, N. Y., has appointed John B. Miller as sales manager of the beverage container division of the company. Mr. Miller formerly was general manager of the Pepsi-Cola Elmira Bottling Co.



The new Strietmann bakery has a floor space of 6½ acres

LAMSON *Conveyors*

helped this Ultra-Modern Bakery Achieve Greater Production . . . AT LOWER COST!

● Having outgrown several buildings in its long and progressive history, the Strietmann Biscuit Company of Cincinnati set out, before the war, to erect the most modern and efficient plant that could possibly be built. Lamson engineers cooperated from the time the first blueprints were being prepared.

● The result is a notably efficient production unit, with materials moving uninterruptedly from the receiving department, until they are delivered as finished products to the shipping platform. The flow of cartons is synchronized with the flow of goods, and both can be easily regulated. Provision has been made at every point for changes in size of cartons, and for shifting from dump-pack to hand-pack, as required.

● A detailed description of this superb plant appears in the "Lamson Conveyor" for December, 1943. If you would like a complimentary copy, please fill in and mail the coupon below.

Straight line production is accomplished by these main line conveyors

Large cartons are lifted from the basement to the main floor production line by the squeeze-belt booster

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Production, Characteristics of Oil of Caraway

(*Continued from page* 83)

mann[1] obtained an oil with the following properties:

Specific gravity at 20°C.	0.896
Specific optical rotation	+71°0'
Content of carvone	47.0%
Content of limonene	Much less than in the oil from the flowering plants (see above).

The same author contended that oxidation in the caraway plant converts more than 50 percent of limonene into carvone within two weeks and that reducing forces, simultaneously at work, are responsible for the presence of dihydrocarveol and dihydrocarvone.

The findings of Sandermann are partly in contradiction to those of Schimmel & Co.,[2] who years ago proved by large-scale distillation tests that the carvone content of caraway seed oil depends upon the state of plant maturity and that it is highest in oils distilled from fully matured seed.

Caraway Chaff Oil

Occasionally, the chaff resulting as a byproduct in the threshing and winnowing of the seed is submitted to steam distillation. The oil resulting should not be added to regular caraway seed oil because it has a harsh, therefore inferior, odor and flavor. It can, however, be employed as a lower grade oil for technical purposes such as the scenting of soaps.

Oil of Cohobation

When cohobating the distillation waters, an oil with a specific gravity of about 0.935 to 0.945 is obtained. It contains a high percentage of water soluble, oxygenated compounds, particularly carvone (75 to 80 percent). This so-called "water-oil" has an inferior odor and flavor and should not be mixed with normal seed oil. It may, however, be used for the manufacture of carvone which can be isolated easily.

Analysis of Caraway Oil

Most important in evaluating caraway oil is the determination of carvone content according to the neutral sulphite method as described in the "National Formulary," Seventh Edition, page 302.

Introduce exactly 10 c.c. of oil of caraway, accurately measured, into a cassia

[1] Ibid.
[2] Ber. Schimmel & Co., October, 1896, 47.

flask, and add 50 c.c. of a saturated solution of sodium sulphite which has been carefully rendered neutral to 2 drops of phenolphthalein T.S. by means of a saturated sodium bisulphite solution. Heat the flask in boiling water and shake it repeatedly, neutralizing the mixture from time to time by the addition of a few drops of the saturated sodium bisulphite solution. When no coloration appears upon adding a few more drops of phenolphthalein T.S. and heating for 15 minutes, cool the mixture to room temperature, and when the liquids have separated completely, add sufficient sodium sulphite solution to raise the lower limit of the oily layer within the graduated portion of the neck of the flask. Note the volume of the residual oily liquid. This volume does not exceed 5 c.c., indicating the presence in oil of caraway of not less than 50 percent, by volume, of carvone.

This official method is to be preferred over the hydroxylamine method. The latter requires 24 hours for completion, using a ½-gram sample, and should be employed only if an insufficient quantity of oil is available.

Determination of the specific gravity, solubility in 80 percent alcohol, optical rotation and refractive index, in addition to the carvone content, usually suffices for evaluating a caraway oil. The "National Formulary's" rigid specifications preclude the possibility of gross adulteration. Additions of terpenes obtained as byproducts from carvone manufacture and terpenes from orange oil are sometimes encountered. Foreign constituents should be looked for particularly in the noncarvone portion of the oil obtained in the neutral sulphite assay. However, the minimum requirement of 50 percent carvone prevents large additions of such material. In order to compensate for the deficit of carvone and for the lowered specific gravity of adulterated oils, other ketones, such as piperitone, or somewhat water-soluble aromatics, like benzyl alcohol, are sometimes employed. They can be identified by their odor or by fractionating the carvone portion of the oil as isolated in the sulphite assay.

According to Gildemeister & Hoffman,[1] the percentage of carvone in the oil of caraway seed can be calculated easily through a simple equation by figuring 0.964 for the specific gravity of carvone and 0.850 for the specific gravity of limonene (more exactly, for all the constituents besides carvone). The equation reads as follows:

$$x = \frac{(a-b)\ .100}{c}$$

where a = specific gravity of oil to be analyzed; b = specific gravity of limonene; c = difference in specific gravity of carvone (0.964) and limonene (0.850); x = percentage of carvone.

[1] "Die Atherischen Ole," 3d Ed., Vol. III, p. 493.

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Conveyors can be built to do more than just carry in a horizontal plane. For example, push bar conveyors can carry and move packages and containers up a slope or incline at 30, 45, or 60 degree angles; vertical lift conveyors will carry commodities straight up and down to the height of several floors. These conveyors that lift and lower can be used individually or combined with a conveyor system to provide uninterrupted flow of commodities between floors.

Push bar conveyors and vertical lift conveyors are part of Standard Conveyor's wide variety of equipment — power and gravity conveyors in belt, roller, chain, and slat types; spiral chutes, tiering machines, portable pilers, pneumatic tube systems.

It's well to remember that Standard Conveyor has been headquarters for conveyors for more than 40 years; we are qualified by long experience to recommend and build efficient equipment for any given installation. Write for catalog FI-104, "Conveyors by Standard"—a profusely illustrated reference book that will prove very useful to you.

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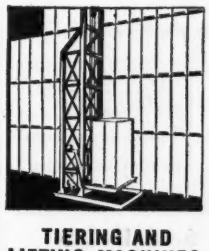
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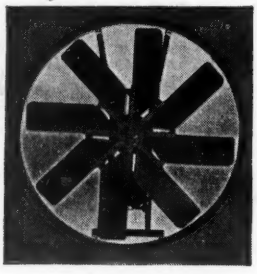

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Fan models, dimensions and performance data can be found
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The STEINLITE electronic moisture tester is accurate for four reasons: (1) It is checked and calibrated against official oven methods. (2) It is designed and built by an organization of electrical engineers—pioneers in the radio field. (3) Materials are the finest obtainable — workmanship by skilled craftsmen — inspection rigid. (4) The Steinlite is about as easy to operate as a radio. No previous experience necessary to get accurate readings.

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More exact, however, is the determination of carvone content by the sulphite method.

Chemical Composition

The first investigations on the chemistry of caraway seed oil date back more than 100 years, when Volkel[1] found that the oil contained an oxygenated compound (then called "carvol") and an oxygen-free compound (then called "carvene"). Their actual nature was recognized much later by Wallach,[2] who identified them as follows:

Carvone ($C_{10}H_{14}O$)—A good oil contains from 50 to 60 percent of carvone, which is the most important constituent and the principal carrier of the characteristic odor of caraway oil.

d-limonene—B.p. 175° at 760 mm. Tetrabromide m.p. 104-105°.

Aside from the above two main constituents, oil of caraway seed, according to the Schimmel chemists,[3] contains small quantities (1 to 2 percent) of other compounds, as follows:

A base of narcotic odor—Its nature has not yet been established. Present only in traces. Oil of anise seed (Pimpinella anisum) contains similar bases.

Dihydrocarvone ($C_{10}H_{16}O$)—B.p. 221° at 735.5 mm.; d_{15}° 0.9297; δ_D—16°18′; n_{D-20}° 1.47107; dihydrodibromide m.p. 69.5-70.5°.

Dihydrocarveol ($C_{10}H_{17}OH$)—Present in the fraction b.p. 94-97.5° at 6 mm. The constants of the purified product are: b.p. 100-102° at 7-8 mm.; d_{15}° 0.9368; δ_D—6°15′; n_{D20}° 1.48364.

Carveol ($C_{10}H_{15}OH$)—Also occurs in caraway seed oil, according to Blumann and Zietschel.[4]

Acetaldehyde, methyl alcohol, furfural, diacetyl—Their presence in the distillation waters was proved by the Schimmel chemists.[5]

Near East and North African Seed Oils

The author carried out distillation experiments with North African and Near East caraway seed and obtained oils of low carvone content (15 to 37 percent). In regard to flavor, they did not compare with Dutch caraway seed oils.

The yield varied from 0.4 to 1.0 percent, which would make commercial production of these oils relatively too costly, especially in view of their inferior quality.

Hungarian Caraway Oil

While the bulk of caraway originates from Holland, limited quantities are produced also in Hungary and other Central European countries. There caraway grows wild in localities with a humid climate, especially in the parts along the Austro-Hungarian frontier. Considerable quantities occur in meadows where the plant is collected by the peasant population for use as a condiment.

[1] Liebigs Ann, 35 (1840), 308.
[2] Ibid., 277 (1893), 107.
[3] Ber. Schimmel & Co., April, 1905, 50.
[4] Ber. 47 (1914) 2628.
[5] Ber. Schimmel & Co., October, 1899, 32.

After World War I, caraway cultivation in Hungary was greatly increased until 200 to 350 hectares (494 to 864 acres) was planted yearly. In 1937, however, only about 50 hectares (123.5 acres) was under cultivation.

Dutch seed is used for planting, but the resulting seed remains relatively small. The yield of oil, too, is less, the difference amounting to about 1 percent. Seed grown in Hungary from Dutch seed yields, upon large scale distillation, from 3.30 to 4.60 percent of essential oil, while wild growing seed from Western Hungary, half the size of the Dutch seed, gives from 5.00 to 5.30 percent of oil. Experiments were also made in Hungary to plant the wild caraway in an endeavor to obtain seed of larger size without losing the higher oil content of the wild growing type. The result was neither a decrease in the yield of oil nor an increase in the size of the seed.

Hungarian caraway seed oil possesses normal physico-chemical properties, the carvone content of the oil from wild seed being around 56 percent.

American Caraway Oil

According to Crooks and Sievers,[1] caraway grows in a wide range of soils, but probably best on an upland, fertile clay. The cultivated plant is usually a hardy biennial. It will withstand a quite severe continental climate and mature seed even in a rather short growing season. The plant is particularly adapted to the cool climate of temperate regions and not so well suited to the warm climate of the South. The most critical climatic factor occurs during the harvest period when rainfall or wind may result in complete loss of the crop.

In irrigated regions of the western and southwestern United States, the possibility of making late summer or fall plantings should be considered. Then it might be possible to harvest about 11 months after planting, instead of waiting 14 months as required when caraway is planted at the usual time in early spring.

According to Stockberger,[2] soil of a somewhat clayey nature containing a fair proportion of humus and valuable plant food is particularly suited to caraway, but the

[1] Condiment Plants, U. S. Department of Agriculture, Bureau of Plant Industry, July, 1941, p. 9.
[2] Drug Plants under Cultivation, U. S. Department of Agriculture, Farmers' Bulletin No. 663, p. 16.

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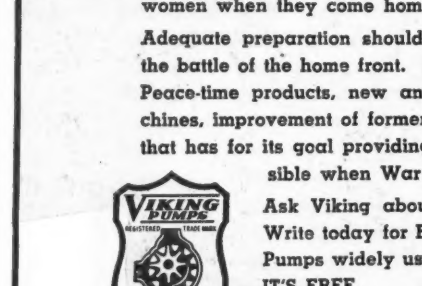

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plant generally grows well in any good upland soil which will produce fair crops of corn or potatoes.

Early in spring, the seed should be sowed in drills about 16 in. apart, from 6 to 8 lb. of seed being required per acre. Frequent shallow cultivation throughout both growing seasons keeps the soil mellow and free of weeds; a weedy crop, at harvest time, usually means a product of inferior quality.

The moment the first seeds ripen, usually in June of the second year, the crop is ready for harvesting. The plants are cut with a mower and left in the swath until almost dry; they may subsequently be built up into small cocks, or brought in from the field for the curing to be finished in a barn loft. If the seeds shatter extensively on handling in the field, the crop should be hauled in tight wagons. Drying completed, the seeds are threshed out, cleaned, and stored in bags of about 100 lb. capacity.

Crooks and Sievers[1] recommend that the seeds be drilled about ½ in. deep. Weedy soil requires hand weeding. Sowing broadcast or in rows too close for cultivation would prevent the adequate control of weeds.

Caraway is usually grown as a biennial by planting in early spring and harvesting in June of the second year. As the seed comes to final maturity in the curing process, there is apt to be an excessive amount of shattering caused by handling of the plants. For this reason, they should be cured in barns or open sheds where the shattered seed can be collected. Seed that does not shatter from the plant after the drying process can easily be flailed by hand or threshed in an ordinary grain thresher.

A yield of 800 to 1,200 lb. of seed may be expected under favorable conditions. This does not represent an annual yield, however, because a planting made in early spring does not yield a crop until the second June.

Crooks and Sievers[2] enumerate some interesting reasons for and against domestic production of caraway seed.

Large areas in the North Central states, the Northeastern states, and the Pacific Northwest seem well suited for this crop. The harvest taking place usually in June, it is important to have a good curing season with a minimum of rainfall.

[1] Op. cit.
[2] Ibid.

For this reason, the Pacific Northwest has possibilities especially in dry, irrigated regions. For the same reason, it would be hazardous to attempt cultivation in the Atlantic Coast states and in the Central states. Certain limited regions of the Mountain states that are under irrigation probably offer the best possibilities.

Favorable Factors

Factors which favor caraway cultivation may be enumerated as follows:

1. Considering imports to this country and the possible yields, 6,000 acres would be needed for domestic requirements. This acreage is large enough to make the crop worth while in favorable regions.

2. In normal times, the seed's market value has been rather consistent, permitting an average gross return of from $50 to $70 per acre for each harvest. Under present conditions, three to five times that amount may be obtained.

3. Growing and harvesting of this crop require no special machinery. Any small grain farm would probably possess the necessary equipment.

4. A considerable amount of caraway seed is consumed by local bakeries. Such local markets would take over at least part of the domestic production, thus avoiding transportation costs.

Unfavorable Factors

There are also certain factors which caution against the domestic production of caraway seed—or, at least, advise its limitation:

1. No cash return can be expected until the second year when prices may become unprofitable.

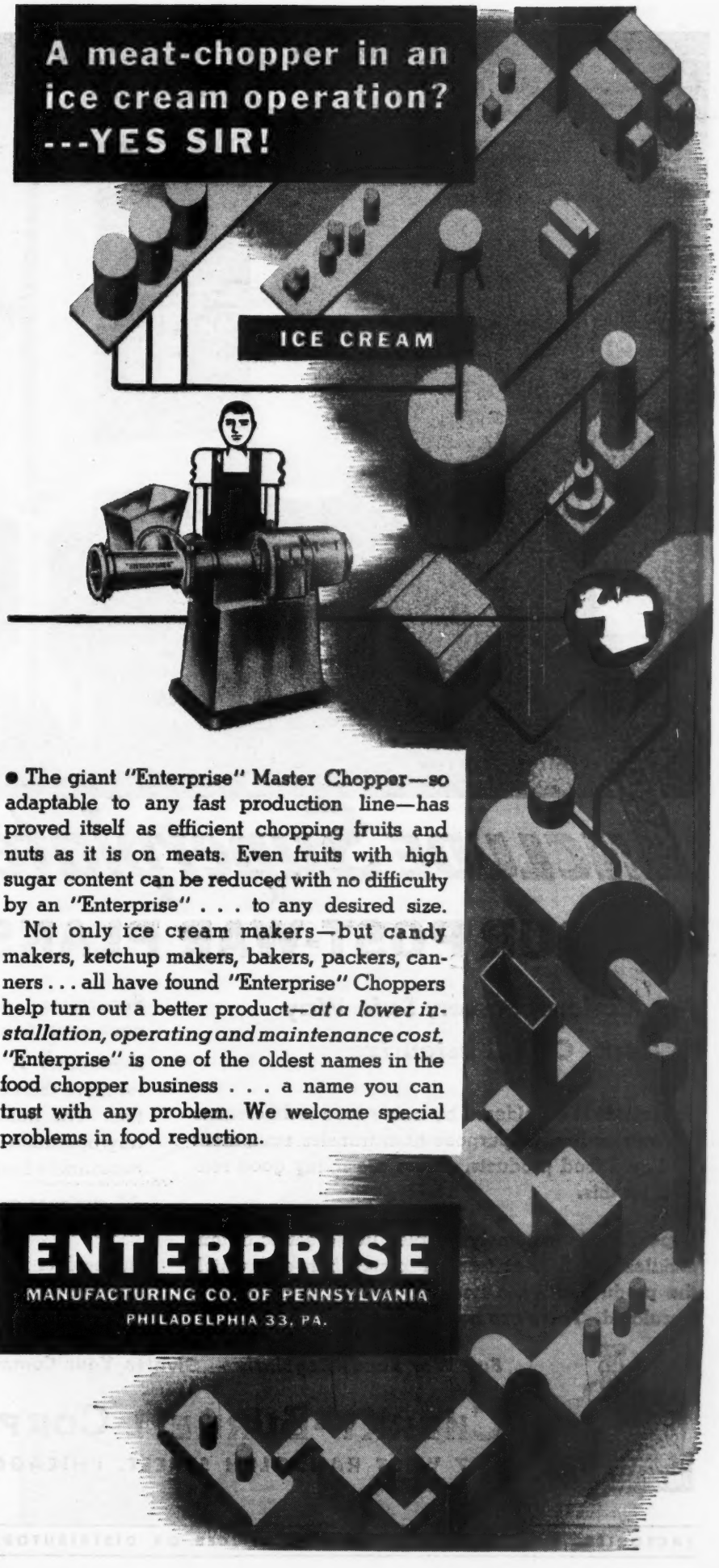
2. Since caraway grows in almost any cool, temperate climate, in normal times there will probably be competition from many parts of the world.

3. A few days of bad weather at harvest time may damage the crop considerably through shattering, or even bring about complete loss by seed spoilage.

Caraway seed grown during the summer of 1943 by A. E. Slessman in Freemont, Ohio, and distilled by Fritzsche Bros., Inc., yielded 4.0 percent of a normal oil which had these properties:

Specific gravity at 25°C.	0.910
Optical rotation at 25°C.	+75°24′
Refractive index at 20°C.	1.4873
Carvone content	59.7%
Solubility at 25°C.	Soluble in 1.0 to 1.5 vol. and more of 80% alcohol.

The oil met the requirements of the N.F. VII and possessed a clean, full caraway odor.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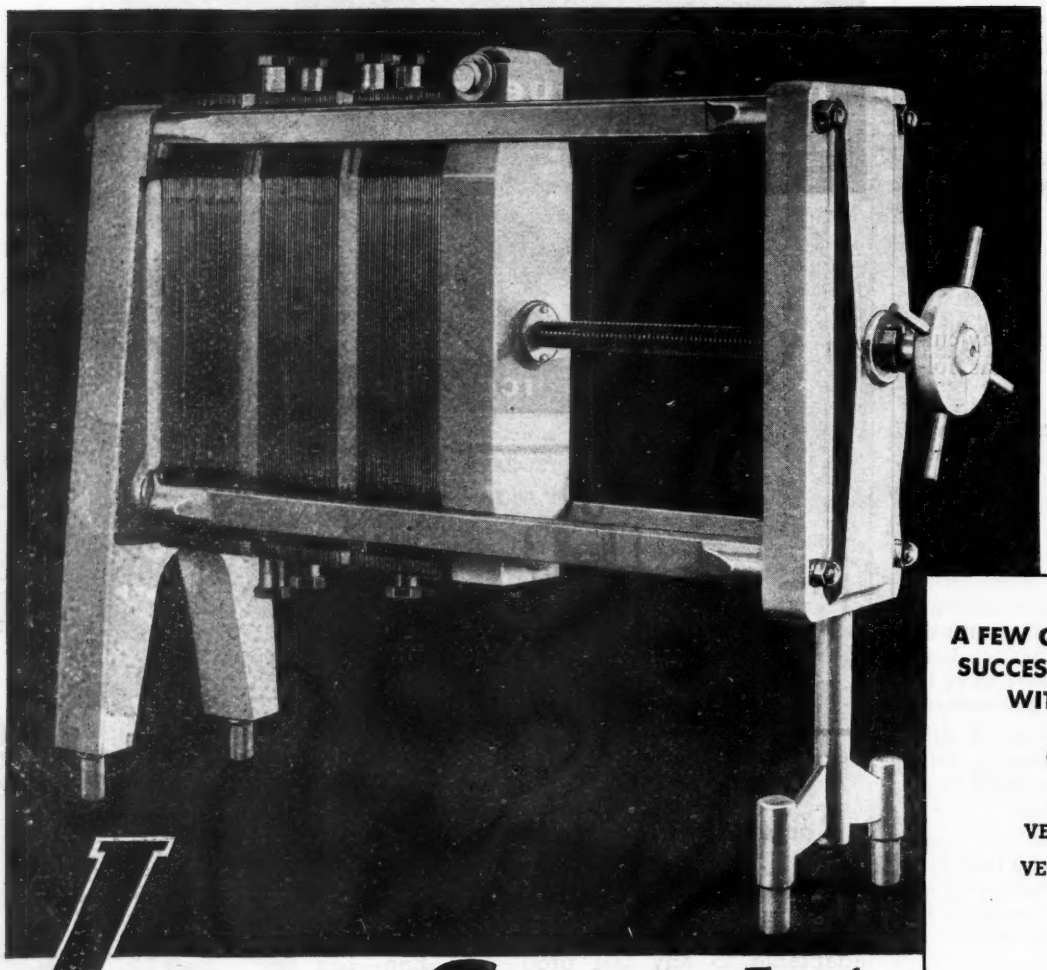
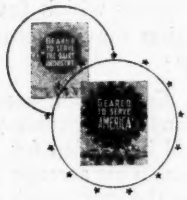


Model J Superplate with plate arrangement for three processing operations to handle up to 14,000 lbs. per hour — one operation up to 40,000 lbs. per hour. Other models with capacities from 2500 lbs. to 50,000 lbs. per hour. What are your requirements?



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The Modern, Faster, Safe Way to Heat, Cool, Pasteurize

Superplate is considered by many food technologists the outstanding all-purpose heat transfer equipment for liquid food products. There are many good reasons for this.

Superplate is extremely simple. Just a series of thin stainless steel heat transfer plates between which the product and the heating or cooling medium is circulated. There are no moving parts to wear.

Superplate is fast—it meets the demand for continuous operations.

Superplate is extremely flexible. It can be used for more than one product and more than one operation. The number of operations or the capacity of any operation can be increased or decreased, within reasonable limits, without loss of original investment.

All surfaces are easy to clean and sterilize. Controls are positive. Maintenance costs are very low.

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FOOD EQUIPMENT NEWS

Fire extinguisher on wheels.

Handy Fire Extinguisher

MOBILITY and ease of operation are all-important factors in combating flames, and with this in mind Randolph Laboratories, Inc., 8 E. Kinzie St., Chicago, has produced a 25-lb. wheel-type carbon dioxide fire extinguisher that is moved and operated with uninterrupted single-sweep action. The extinguisher has a palm-trigger valve mounted conveniently on the steel handle. By grasping the handle, the operator can move the unit and press the release button with one hand, discharging a blanket of carbon dioxide in a large, sweeping arc—10 to 20 ft.

Release of pressure on the palm-trigger automatically stops the flow of carbon dioxide gas, eliminates twisting of valves and retains the remainder of the charge for repeated attacks. The manufacturer states that this simplified operation saves precious seconds and greatly reduces the chances of "operator panic." The extinguisher has a 5¾-ft. horn-and-hose connection, permitting accurate aiming of the current of charge at the base of the flame. Also, it enables the operator to remain at a safe distance from the heat of the fire.

This particular type of extinguisher is especially recommended for protection against gasoline, oil, paint, grease, machine, electric and surface fires.

Wet Flashlight Battery

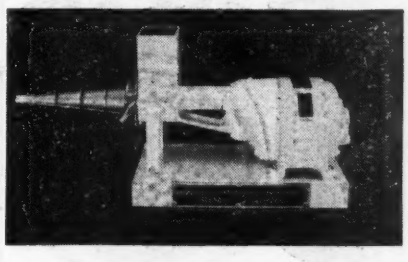
BUILT on the principle of the automobile storage battery, a rechargeable wet flashlight battery for industrial use is announced by B. F. Goodrich Co., Akron, Ohio. The company reports that this new type of wet-cell battery was placed in test 18 months ago is still giving excellent service. The company claims that the battery is more economical than the dry cell when extensive flashlight service is required. A freshly charged battery will give about three hours of constant light.

The new wet battery requires a special 1.9-volt, 0.6-amp. Mazda lamp, which comes in screw-base and flange-base design. Wattage consumed with the battery is 50 percent more than with the dry cell and the light is distinctly brighter. The light is constant, since the voltage drop between a fully charged and discharged wet cell battery is only 0.35 volts.

Recharging equipment also is available.

Pureeing Machine

VALLEY FOUNDRY & MACHINE WORKS, INC., 710 H St., Fresno, Calif., announces a machine for pureeing such products as berries, oranges, apricots, peaches, nectarines and tomatoes. Direct-connected to a gearhead motor, a manganese-bronze tapered screw is housed in a stainless steel screen. The unit is furnished with screens of three different perforation sizes. The pureeing material is fed into the cast-bronze feed hopper and is forced through the screen. Solids such as seeds, skins and stems are discharged at the end of the tapered screw. This machine has a capacity of 1,000 lb. to 1 ton per hour, depending upon the variety and condition of fruit being processed.



Machine for pureeing fruits and berries.

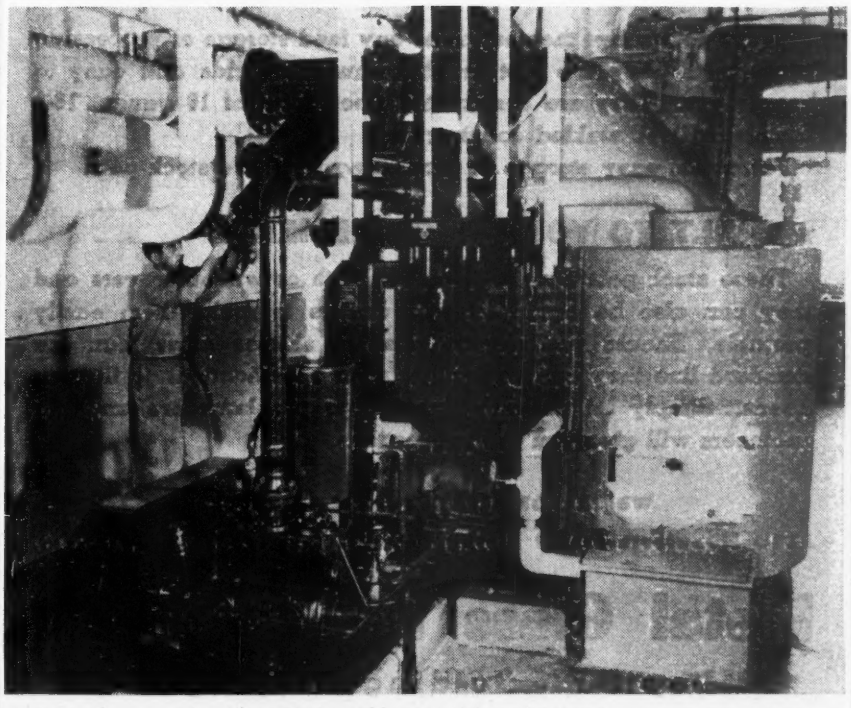
Sublimation Dehydrater

EQUIPMENT for dehydrating products in the frozen state has been developed by National Research Corp., Boston 15. Suited to large-scale desiccation of heat-sensitive foods, this equipment is now being used chiefly for drying blood plasma and penicillin.

The substance to be dried is first frozen, then placed in a vacuum-tight chamber. By means of the vacuum diffusion process pumping equipment, the chamber is quickly evacuated to a pressure of between 100 and 200 microns of mercury. Heat is applied to the substance, though never enough to cause it to melt, and the water vapor is removed by sublimation and deposited upon a radically new type of cold trap. At the end of the drying cycle, pressures below 10 microns are obtained. Economical operating costs and an extremely low final moisture content of product are claimed.

Dust Collector

MANUFACTURED in four sizes, the Dustex portable dust collector is designed to meet the need for an efficient and eco-



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These stock pots can be furnished with or without covers and they can also be equipped with casters to make them easily portable. Should you require sizes or shapes other than our standard line they can be built to your specifications to fit your needs. Simply let us know what your problems are and our engineers will give you our suggestions.

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Dept. FI. Belding, Michigan

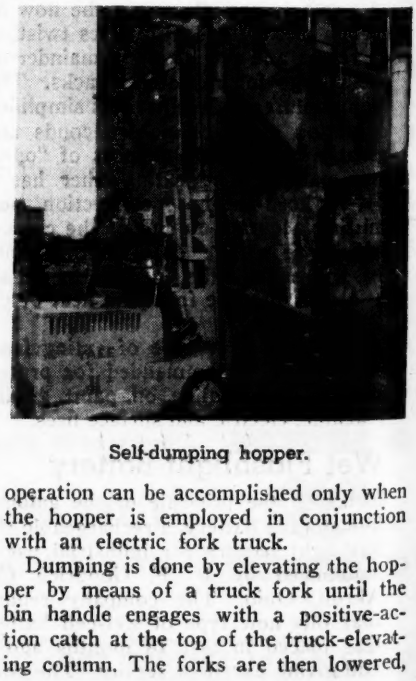
Dust collector.

nomical means of removing dust from the air. It is built by the Dust Filter Co., 4418 N. Clark St., Chicago 40.

The principle underlying the unit is the compound action on the air-borne dust, first by centrifugal separation from the air stream and second by impingement on the filter surface. The unit maintains constant static air suction of more than 4 in. at a velocity of over 5,000 linear feet per minute. The unit is said to be completely fireproof. It weighs from 75 to 200 lb. and is 30 to 51 in. high.

Self-dumping Hopper

LOOSE MATERIALS to and from processes may be handled by a new self-dumping hopper built for attachment to a Yale electric fork truck. This hopper is an all-metal skid bin with a hinged bottom. It can be picked up easily and moved by hand-lift truck, but the dumping



Self-dumping hopper.

operation can be accomplished only when the hopper is employed in conjunction with an electric fork truck.

Dumping is done by elevating the hopper by means of a truck fork until the bin handle engages with a positive-action catch at the top of the truck-elevating column. The forks are then lowered,

leaving the hopper suspended; antifriction rollers on the back of the bin permit the forks to slide down easily. Then the unsupported hinged bottom opens, allowing the contents to discharge from the hopper.

The empty hopper is released easily from the catch on the elevating column by raising the fork. The feed hopper is then lowered on the fork and carried away for refilling.

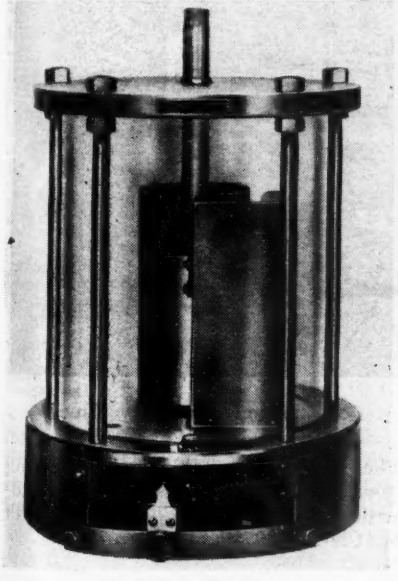
The Yale & Town Manufacturing Co., Philadelphia 24, Pa., is the manufacturer.

Liquid Flow Splitter

LIQUID flow is accurately divided into two streams by a new splitter, the Micro-Rotaweir, made by Fischer & Porter Co., 925 County Line Rd., Hatboro, Pa.

The proportions of the flow division may be varied at will by adjusting an outside lever and pointer to the percentage desired, as indicated by an external scale.

Operation is as follows: An inlet pipe discharges the liquid into a receiving chamber which has a rectangular weir as an overflow. A vertical knife edge is set against the external edge of the weir, thus dividing the stream into two parts as it flows over

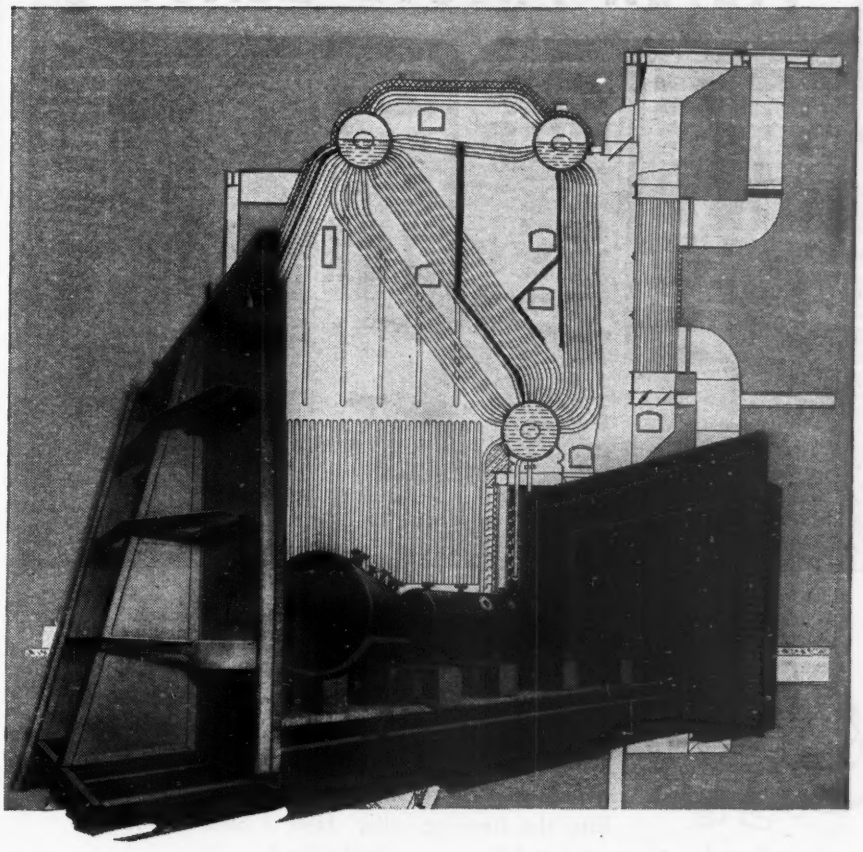


Flow-splitting device.

the lip of the weir. One of the streams flows into a closed compartment with a bottom outlet; the other stream spills into the area surrounding the receiving chamber and also discharges from the bottom. The receiving chamber is connected through a stuffing box at the bottom to an external lever by means of which the weir may be rotated to any position with respect to the flow-dividing knife edge.

This new device may be obtained with fittings in any metal. The shell may be either metal or Pyrex. For high-melting-point fluids, the shell may be lagged and steam-heating coils placed inside the device. The unit will handle flows from 30 to 900 gal. per hour.

UNION



ALL UNION WELDED VESSELS are stress relieved in this large zone controlled furnace. Gas fuel under six point potentiometer automatic control provides uniform temperature throughout this special furnace. The use of gas assures a neutral atmosphere within the furnace and prevents oxidation and scaling of the charge. Union, strategically located, is equipped to build to your exacting specifications. Write for booklet that describes our facilities. Send us your inquiry.

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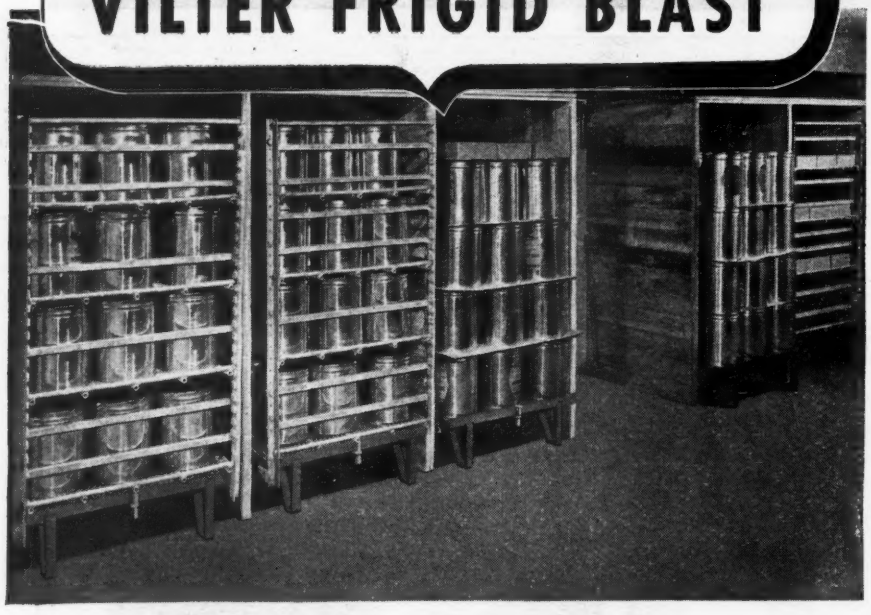
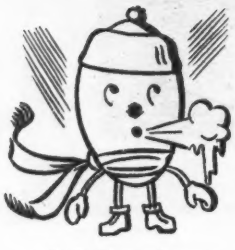
STEAM GENERATING EQUIPMENT

EGGS
Frozen Faster with
VILTER FRIGID BLAST





At Central Warehouse, St. Paul, Minnesota, the Vilter Frigid-Blast Freezing system shown above freezes fresh eggs in 30 lb. containers on an "Around-the-Clock" schedule. Whole, fresh eggs are broken, tested for quality, poured into 30 lb. containers, loaded onto platform skids and wheeled into the freezing cells. Here a blast of sub-zero air is forced over, around and through each skidload.

RESULT: Quality, frozen eggs in *shorter freezing* time. And the original equipment investment and operating cost is surprisingly low.

The Vilter Frigid-Blast Freezer at Central Warehouse also freezes meats and poultry.

Frigid-Blast Freezing is only one of many developments at Vilter contributing to improved food processing and storage today. Frigid Blast Systems are used to freeze all types of food products in any quantity, either in batches or by continuous process.

For faster freezing specify complete systems by Vilter.

ARMY NAVY

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Combination Truck

THE Transporter has a foot-operated hydraulic-lift and an electric front-wheel drive. The equipment is designed for economical and safe lifting and short hauling of loads at safe walking speeds. It handles skid-platform loads up to 6,000 lb. or pallet unit loads up to 4,000 lb.

The platform or forks are hydraulically lifted by pump and ram action, with easy foot-lever operation. A conveniently located pedal provides shock-proof lowering of loads.

With the front-wheel drive, constant power is provided for maneuverability in close quarters, enabling an operator, either man or woman, to do a great amount of work.

The drive control has a forward- and reverse-speed push-button built into the guide handle for easy thumb-tip control. Two speeds forward and two speeds reverse are controlled by raising and lowering the guide handle.

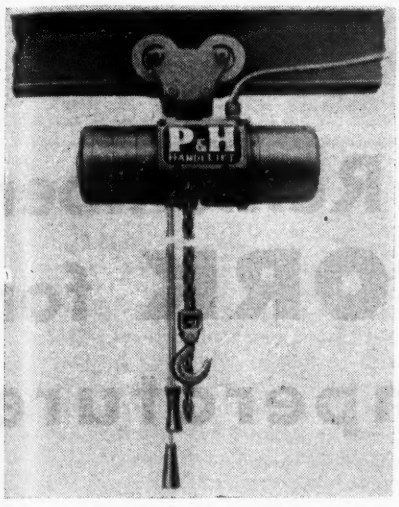
Combination foot and power truck.

The steering turntable is ball-bearing mounted. This truck is made by Automatic Transportation Co., 101 W. 87th St., Chicago 20, Ill.

Small Power Hoist

Low cost and convenience are features of the small Handi-Lift electric chain hoist developed by Harnischfeger Corp., 4460 W. National Ave., Milwaukee, Wis. The unit is rated at 500 lb. but has high reserve capacity and a chain tested for 1,800 lb. Operation is by pull cord. The hoist is of fully-enclosed construction to permit use under any condition of weather, dust, moisture or acid fumes. Dual braking is provided by a large spring-set electric motor brake which automatically releases when the hoist is operated and sets instantly when the current is cut off. Lowering control is by dynamic means supplemented by the spring-set brake which holds the load in the event the current fails.

The motor is of the high-starting-



Small electric chain hoist.

torque, reversible type with bearings sealed in grease. The unit operates on 3-phase, 60 cycle current, 220 or 440 volts.

MATERIALS

Adhesives

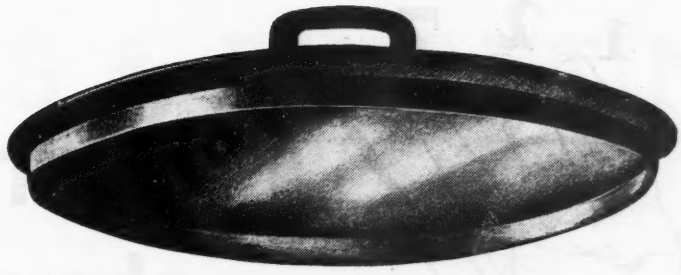
DEVELOPMENT of a new line of synthetic rubber adhesives with a nontoxic solvent is announced by B. F. Goodrich Co., Akron, Ohio. One of the adhesives is for general utility use and is a type which will adhere to almost any clean surface. For metal adhesion, two special cements, in what is known as the Plastilock 300 series, have been developed.

Carton Reconditioner

USED CARTONS, boxes, baskets and crates may be reconditioned with S-10 container coating announced by Martin Varnish Co., 900 W. 49th Place, Chicago 9, Ill. This coating covers old stenciling, markings and printed matter in one application. It may be applied by brush or spray, it dries in a few minutes, contains no poisonous ingredients, is not inflammable and provides a fresh, kraft-colored surface for new stenciling or markings, the manufacturer states. The coating is suitable for resurfacing both wood and paper containers.

Prepared Buffers

BURRELL TECHNICAL SUPPLY CO. 1936-42 Fifth Avenue, Pittsburgh 19, Pa., announces a comprehensive line of exactly compounded solid buffers covering the region 2.0 to 12.0 pH in steps of 0.20 pH. From 50 different formulas it is possible to select the exact pH value required, with assurance that the resulting buffer will be correct to within 0.02 pH. These Coleman certified buffer tablets are packed 12 per glass vial, protected by a hermetic wax inner seal and a bakelite screw cap. The buffer solution is prepared by dissolving one tablet in 100 ml. of warm, distilled water.



The man to look for

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THE lid's off *now* on new ideas in processing, in packaging, in equipment . . . in just about every phase of the food industry. That means a lot of changes in all kinds of operations. *Cleaning* included!

At a time like this . . . when expert advice is essential . . . the man to look for is your Wyandotte Representative. With a complete line of cleaners at his command, he is prepared to tackle every type of sanitation problem, in every type of plant . . . from canning to quick-freezing.

Need help on scouring utensils or washing containers? A few tips on speeding maintenance tasks? Or perhaps a safe method of germicidal protection? Your Wyandotte Representative is ready with ways and means to produce a *specialist's* results on all such jobs.

Why not get in touch with him today? His services may well save you money for many tomorrows.

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4 FACTS to Remember about CORK for Low Temperature

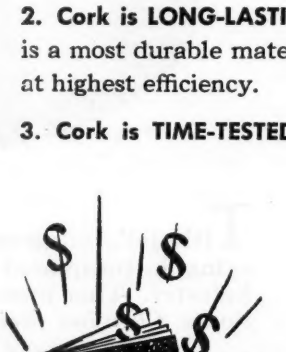
CORK is one of the most useful materials known to man. Not only has it been in service longer than history can record, but its use has greatly increased with the need for modern industrial efficiency and economy. The reason for this is that Cork is completely unique in its physical structure and qualities. There's *nothing* like Cork!

For low temperature operation, here are four facts to remember:

1. Cork is MONEY-SAVING! Millions of dead-air cells in every square inch of Cork insulation cause it to serve as a most efficient *natural* barrier to heat flow. By its use, refrigeration is conserved to the most practical limits.

2. Cork is LONG-LASTING! Cork has a high degree of stability; is a most durable material. It continues to serve for many years at highest efficiency.

3. Cork is TIME-TESTED! The use of Cork insulation has kept pace with the development of refrigeration and cold storage. Its wide acceptance in these "heavy-duty" industries is due to its proved record for more than 40 years.



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4. Through 79 years as Cork specialists, we are able to preserve Cork's natural advantages in Mundet insulating products. Mundet engineers offer responsible assistance in building or expanding low temperature facilities. Let us help you secure low operating cost and maximum service. Mundet Cork Corporation, Insulation Division, 65 South 11th Street, Brooklyn 11, New York.

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CONSERVES LOW TEMPERATURE

CATALOGS & BULLETINS

FOOD PLANT EQUIPMENT

Stainless Steel Equipment—A 16-page bulletin well illustrated with photographs of a highly diversified line of stainless steel equipment has been issued by Alloy Fabricators, Inc., Perth Amboy, N. J. The booklet enumerates special services which the company can render and then illustrates typical pieces of equipment it has built for food manufacturers. Among them are kettles of various sizes, milk tanks, coolers, dust collectors and deaerating tanks.

Pumps and Other Equipment—Bulletin WP 1099-B 37B devotes 20 pages to the description of centrifugal, steam, power and rotary pumps; compressors; refrigeration equipment, meters, water-purification equipment, ejectors and diesel engines. Issued by Worthington Pump & Machinery Corp., Harrison, N. J., the bulletin is well illustrated, and it gives capacities, dimensions and other pertinent engineering data. About 10 pages are devoted to pumps.

Scales—Now ready for distribution is a catalog of Kron scales which can be secured from Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia 24. Known as No. R-44, this catalog covers the entire Kron scale line from dormant and portable platform types to special counting, batching, tensile-strength and dynamometer models. It is fully illustrated and gives complete specifications and dimensions.

Centrifugal Pumps — The well-illustrated 20-page Bulletin No. 447, issued by the Chain Belt Co., 1600 W. Bruce St., Milwaukee 4, Wis., describes Rex Speed Prime Pumps. These are general-purpose, self-priming centrifugal units, made in sizes ranging from 1½ to 8 in. and capacities between 3,000 to 125,000 gal. per hour.

CONTROL EQUIPMENT

Process Controllers—Four bulletins describing instruments put out by Wheelco Instruments Co., Chicago 7, have been announced. The 4-page Bulletin J602-2 describes the new Throttltrol, a simplified valve-positioning device. Bulletin J403-2 describes the new automatic Inputrol, while Bulletin J402-2 covers the manual type. These instruments maintain the desired supply of electrical power or heat or the proper flow of liquids or gases to any process. Bulletin J303-2 describes the improved Rheotrol, also a device to maintain a desired electric power or heat input or flow of liquids or gases to a process.

Scientific Control—Food and beverage plant executives will be interested in a bulletin entitled "Scientific Control of Foods and Beverages," just issued by Schwarz Laboratories, Inc., 202 E. 44th St., New York 17. This bulletin describes the scope of the services rendered by this organization, including chemical and biological analyses of food and beverage materials. The bulletin is well illustrated with more than two dozen photographs showing how tests, analyses and research are conducted. Also included are case studies of instances in which processors have been helped to protect quality and salability of their products.

Flow Meters—To show proper methods of installation, operation and maintenance of Rotameters, Fischer & Porter has issued the 4-page Bulletin 52-B. It is well illustrated and gives general instructions on how the various floats operate and how to install them. The Rotaweir flow splitter also is described.

PLANT SUPPLIES

Flat-belt Drives—Information on steel split pulleys and bushings, shaft collars, hangers and bearings, split and solid conveyor pulleys, as well as belting, is given in a flat-belt drive equipment catalog published by American Pulley Co., 4200 Wissahickon Ave., Philadelphia 29. The application, design and advantages of group drives are discussed.

Detergents — Recently revised, the 23-page bulletin on food plant sanitation issued by the Rex Co., Iowa, covers both alkaline and acid detergents. Detailed instructions are given on how to apply concentrations designed to produce optimum results.

Adhesive Data Sheet — An adhesive-problem data sheet—a questionnaire for transmitting information on your adhesive requirements to the manufacturers—has been published by Paisley Products, Inc., 1770 Canalport Ave., Chicago 16.

Motor Pulleys—The composition, design and methods of manufacturing Hi-Torque motor pulleys are described in a catalog issued by American Pulley Co., 4200 Wissahickon Ave., Philadelphia 29. The catalog contains dimensions for and list prices of the standard pulley sizes, as well as complete price information for made-to-order pulleys.

MAINTENANCE

Tire Maintenance—Designed to help truck operators increase tire mileage and conserve rubber. "Truck Tire Tips," a 24-page catalog describing and illustrating the mounting and dismounting of truck tires, the effects of load and speed on tire service and other maintenance information, has been issued by Associated Tire Lines Division, B. F. Goodrich Co., Akron, Ohio.

Protective Coatings—White Hot and Pyro-Chrome protective coatings which are resistant to heat, corrosion and oxidation, are described in "New Approaches to Surface Protection," a 12-page publication put out by Utilities Manufacturing Corp., 1860 Broadway, New York 23.

Bearing Lubrication—Pictures in a pamphlet published by Farval Corp., 3248 E. 80th St., Cleveland 4, Ohio, illustrate how the hazards in the manual lubrication of bearings on "off the floor" equipment may be eliminated by sending lubricant under pressure from a central pumping unit.

Plant Sanitation—Oakite Products, Inc., 22 Thames St., New York 6, announces a new enlarged sanitation and maintenance digest for food plants. It describes 61 essential sanitation and maintenance tasks generally performed in the food industries. The digest reviews the materials used and the methods employed. Its discussions of sanitary routine include concise and complete data on safely cleaning numerous types of cooking, mixing, cutting, conveying, smoking, curing, hanging, stuffing, packing and other processing equipment.

MISCELLANEOUS

War Contract Terminations—An inter-organization contract termination procedure, which is applicable to terminations of prime contracts and subcontracts, is briefly outlined in a 12-page catalog entitled "How One Company Organized to Handle War Contract Terminations" issued by Lyon Metal Products, Inc., Aurora, Ill.

Business Management—Three reports, Nos. 152, 153 and 154, which discuss the most effective means of obtaining efficient present and postwar production, particularly applicable to those manufacturers facing problems of postwar reconversion, have been put out by George S. May Business Foundation, 111 S. Dearborn St., Chicago 3.

BOOKS

Food Research

INDEX TO THE LITERATURE OF FOOD INVESTIGATION. Compiled by Agnes Elisabeth Glennie. Published by His Majesty's Stationery Office as Vol. 15, No. 1, June, 1943. For sale through British Information Service, 30 Rockefeller Plaza, New York 20, N. Y. 85 pages; 6x9½ in.; paper. Price, $1.35.

Although late in making its appearance, the index carries on the task of extracting the food articles from the literature of the world. Food technologists will find this edition to be on a par with its predecessors despite the difficult wartime conditions.

Bakers' Wages

UNION WAGES AND HOURS IN THE BAKING INDUSTRY. Prepared by U. S. Department of Labor, as Bulletin No. 778. For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., 1944. 62 pages; 6x9⅛ in.; paper. Price, 10 cents.

This survey of union wages and hours of bakery workers in 65 cities, as of June 1, 1942, and July 1, 1943, throws light on the upward trend of wages and the slight reverse trend in hours.

Field representatives of the bureau of labor statistics collected the data directly from a responsible official of each union involved. Where possible, the scales were checked against written agreements. The results are broken down by cities, by types of baking and by occupation and reveal an average hourly wage rate, for the industry as a whole, of $0.847 in July, 1943, an increase of almost 20 percent over 1939.

Choosing Key Help

HOW TO SELECT FOREMEN AND SUPERVISORS. By R. C. Oberdahn. Published by National Foremen's Institute, Inc., Deep River, Conn., 1944. 53 pages; 5½x8⅛ in.; cloth. Price, $2.00.

This is a helpful little book for top management in any industry. It should apply particularly to food manufacturers in whose plants delays and inefficiency on the production lines can bring about important losses through spoilage, breakage and waste of all kinds.

The book describes the foreman's duties and discusses the old and new methods of selecting a foreman. The author concludes with the warning that in order to train supervisors in the most efficient manner, you must be sure to have individuals properly equipped to absorb the training.

Data on Fats and Oils

ANIMAL AND VEGETABLE FATS AND OILS. Prepared under supervision of Zellmer R. Pettet. Published by U. S. Department of Commerce, 1944. For sale by Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. 30 pages; 5¾x9⅛ in.; paper. Price, 10 cents.

Factory production, consumption and wholesale stocks, as well as imports and exports for each important animal and vegetable fat or oil, are covered in this report.

Since the data are limited to factory production, they do not represent the total of all fats and oils produced. The figures do include, however, the entire production for such oils as cottonseed, peanut, coconut, corn, soybean, olive, palm-kernel and others that require heavy equipment to produce.

All About Starch

CHEMISTRY AND INDUSTRY OF STARCH. Edited by Ralph W. Kerr. Published by Academic Press, Inc., 125 East 23rd St., New York 10, N. Y., 1944. 471 pages; 6⅛x9¼ in.; cloth. Price, $8.50.

The ultimate organization of the starch granules, the chemical structure of starch molecules, and their behavior in solution and dispersion have all been materially clarified by recent research, and this book attempts to place these developments before the reader. The subject matter is presented in the form of descriptive chemistry, since the book is addressed not only to the carbohydrate chemist but to the technologist whose daily task is concerned with more efficient production and utilization of starch products.

The occurrence in nature, the manufacture and the physical and chemical properties of corn, tapioca, wheat, potato and other industrial starches are numbered among the chapter headings, as are the uses of these starches in baked goods, salad dressings and confections.

Dehydration Manual

VEGETABLE AND FRUIT DEHYDRATION. Prepared by Bureau of Agricultural and Industrial Chemistry of the Agricultural Research Administration, 1944. For sale by Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. 218 pages; 6x9¼ in.; paper. Price, 30 cents.

A great many answers to the technological and engineering questions that arise in establishing and operating a food dehydration plant can be found in this convenient reference manual, which is designed for commercial operators. Problems such as plant location, plant lay-out, storing and handling raw materials, preparation of the material, blanching, sulphuring, tunnel and cabinet dehydrators, and costs are among the subjects treated.

The publication is based on both earlier and more recent research, and each division of the general subject is designed to facilitate application in commercial production.

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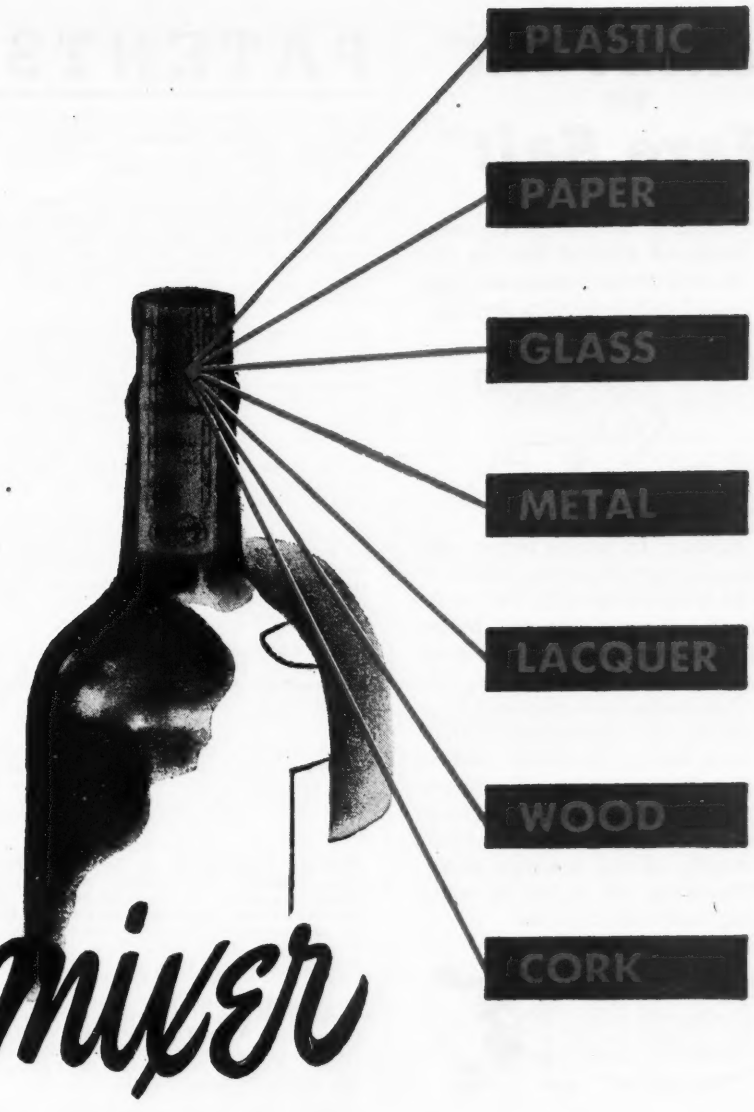
When an adhesive must be *a good mixer*



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National's strip-stamp adhesive does just such a difficult surface variety job. Yet it's only *one* of National's large family of resin adhesives. *Another* is providing water-resistant label protection to pyramiding supplies on the Western Front. *Still others* are bonding everything from lampshades to luggage and bomb rings to bandage boxes. *All* are performing difficult jobs – successfully.

Whatever your specific combination of conditions may be – the surfaces, application methods, field considerations – National as a pioneer in industrial as well as laboratory research, can simplify and speed-up your regular run of work and meet new problems as they arise. Your inquiry is invited – NOW!

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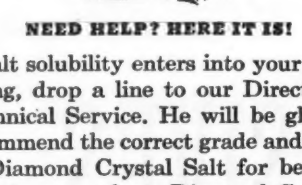
ONE OF OUR most difficult problems in selling Diamond Crystal Salt is the apathy of food technologists and salt buyers toward salt. Too often they say, "Oh, well, salt is salt."

Take solubility: In salting butter, salt must dissolve with lightning speed. If the butter fat is on the soft side—lacking in body—at certain seasons, butter salt must dissolve so quickly that overworking is avoided. Otherwise, the butter may lose its desirable physical properties and become mottled or marbled—and may lose its moisture, become leaky. Yet, if the salt is not properly dissolved, the butter may be gritty. On the other hand, in salting cheese, slow solubility of salt is highly important. Otherwise, salt is lost in whey, producing undersalted cheese.

To meet these problems, we have set up definite solubility standards for Diamond Crystal Salt. Our Diamond Crystal Butter Salt, for example, dissolves completely in water at 65° F. in less than 9.8 seconds—average rate, 9.2 seconds. Quality-minded food processors can depend on Diamond Crystal products, manufactured under strict quality-control standards for solubility rate.



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DIAMOND CRYSTAL
ALBERGER PROCESS **SALT**

PATENTS

Edible Fats in Liquid Form Treated With Tannin to Inhibit Rancidity—Bruno J. Verbeck, to Wilson & Co., Inc., Chicago, Ill. No. 2,354,719. Aug. 1, 1944.

Juice Mechanically Extracted From Fruit in Continuous Manner by Rotating Cupwheel Multistage Unit—Charles S. Walker, Clearwater, Bronson C. Skinner, Dunedin and James J. Rucker Bristow, Safety Harbor, Fla., to Bronson C. Skinner. No. 2,354,721. Aug. 1, 1944.

Waxy Starch Suspension in Water Stabilized by Treatment With Active Oxidizing Agent at pH of 7 to 11 and Temperature Below Pasting Point—Herman H. Schopmeyer and George E. Felton, Hammond, Ind., to American Maize-Products Co. No. 2,354,838. Aug. 1, 1944.

Oysters Shucked Mechanically—Geronimo R. Ragupos, Spokane, Wash. No. 2,354,928. Aug. 1, 1944.

Dry Oat Flour Made To Have More Than 20 Percent Total Protein, and Starch Content Low in Comparison With Dehulled Oats—Sidney Musher, to Musher Foundation, Inc., New York, N. Y. No. 2,355,028. Aug. 1, 1944.

Water Thickening Agent Made From Coarse Fraction of Dehulled Oats Ground to Pass Through 60 Mesh Screen—Sidney Musher, to Musher Foundation, Inc., New York, N. Y. No 2,355,029 Aug. 1, 1944.

Food Product Containing Small Quantity of Dry-milled Oat Flour Having Total Protein Content in Excess of 20 Percent—Sidney Musher, to Musher Foundation, Inc., New York, N. Y. No. 2,355,030. Aug. 1, 1944.

Product Containing at Least 20 Percent Sugar, Made To Contain as Ingredient Small Quantity of Dry-milled Oat Flour Having Total Protein Content in Excess of 20 Percent—Sidney Musher, to Musher Foundation, Inc., New York, N. Y. No. 2,355,031. Aug. 1, 1944.

Ice Cream and Ice Milk Made To Have as Ingredient Small Quantity of Dry-milled Oat Flour With Total Protein Content in Excess of 20 Percent—Sidney Musher, to Musher Foundation, Inc., New York, N. Y. No. 2,355,032. Aug. 1, 1944.

Plastic Mass Made by Dispersing in Water Heat-plasticized Portion of Ground Dehulled Oats Too Coarse to Pass Through 60 Mesh Screen—Sidney Musher, to Musher Foundation, Inc., New York, N. Y. No. 2,355,033. Aug. 1, 1944.

Zein-containing Protein Solutions Prepared Directly From Gluten—Roy E. Coleman, Chicago, Ill., to Time, Inc., No. 2,355,056. Aug. 8, 1944.

Milk and Similar Perishable Beverages Aseptically Packaged in Airtight Sealed Empty Fiber Containers—John M. Hothersall, Brooklyn, N. Y., to American Can Co., New York, N. Y. Nos. 2,355,073 and 2,355,074. Aug. 8, 1944.

Vegetable Phosphatides Given Increased Solubility in Oil by Addition of Small Quantity of Concentrated Phosphoric Acid and Glycerol Phosphoric Acid—Percy L. Julian, Maywood, and Edwin W. Meyer, Evanston, Ill., to The Glidden Co., Cleveland, Ohio. No. 2,355,081. Aug. 8, 1944.

Containers of Varying Heights Filled With Liquid by Automatic Mechanical Means—John D. Le Frank, Maplewood, N. J., to American Can Co., New York, N. Y. No. 2,355,089. Aug. 8, 1944.

Oxidative Deterioration of Foods Retarded by Addition of Small Quantity of Water Extract of Oats Containing Low-molecular-weight Aliphatic Alcohol—Sidney Musher, to Musher Foundation, Inc., New York, N. Y. No. 2,355,097. Aug. 8, 1944.

Corn Extract for Addition to Food Products Prepared From Corn by Extraction With Water and Purification With Organic Solvent Selected From Lower Molecular Weight Aliphatic Hydroxy Compounds—Sidney Musher, to Musher Foundation, Inc., New York, N. Y. No. 2,355,098. Aug. 8, 1944.

Riboflavin Recovered From Butanol Extract of Fermentation Residues by Addition of Petroleum Ether—John C. Keresztesy, Westfield, and Edward Rickes, Rahway, N. J., to Merck & Co., Inc., Rahway, N. J. No. 2,355,220. Aug. 8, 1944.

Potato Soup Base Made To Consist of Ground Potato Chips Previously Pressed To Remove Oil Retained From Deep-fat Cooking—Betsy Ross, Stouchsburg, Pa. No. 2,355,394. Aug. 8, 1944.

Scales Removed From Fish by Automatic Mechanical Means—Michel P. Vucassovich, Beverly, Mass., to Gloucester Research Corp., New York, N. Y. No. 2,355,405. Aug. 8, 1944.

Starch Particles Covered With Water-immiscible Oxidation Retardant Preparatory to Exposure to Action of Oxidizing Agent—Walter A. Nivling, Newton, Mass., Lyman E. Nivling and Owen C. Nivling, administrators of Walter A. Nivling, deceased. No. 2,355,463. Aug. 8, 1944.

Sucker-type Confections Packaged Into Bags by Mechanical Means—Swan F. Anderson, Rockford, Ill. No. 2,355,500. Aug. 8, 1944.

Chocolate Aerated During Conching—George Lawton, Highgate, London, England. No. 2,355,539. Aug. 8, 1944.

Sausage and Other Food Compositions Made To Contain Small Quantity of Dry-milled, Substantially Fat-free Oats Having Relatively Low Starch and Relatively High Protein Content When Compared to Dehulled Oats—Sidney Musher, to Musher Foundation, Inc., New York, N. Y. Nos. 2,355,547 and 2,355,548. Aug. 8, 1944.

Wheat Germs Mechanically Agitated While Subjected to Heating Action of Plural Infrared Lamps—Paul Naeher, Evanston, and Maurice T. Williams, Oak Park, Ill., to B. F. Gump Co., Chicago, Ill. Nos. 2,355,670 and 2,355,671. Aug. 15, 1944.

Peas and Like Graded for Quality by Separation According to Differences in Specific Gravity—Charles E. Kerr, Hoopeston, Ill., to Food Machinery Corp., San Jose, Calif. No. 2,355,735. Aug. 15, 1944.

Foodstuffs Precooked in Continuous-type Steam Blancher—Ervin H. Guthier, Santa Ana, Calif. No. 2,355,798. Aug. 15, 1944.

Grain Kernels Made To Flow in Opposite Direction to Liquid Spray Preparatory to Subsequent Mechanical Treatment for Removal and Separation of Epidermis Covering—Walter W. Loewy, New York, N. Y. No. 2,355,810. Aug. 15, 1944.

Biscuits, Cookies and Like Mechanically Transported From One Level to Another by Lifting Action of Inner Endless Belt Driven by Drum of Relatively Large Diameter Fitted With Pair of Disks Which Support Plural Spaced Wires Covered With Soft Padding to Minimize Damage to Biscuits and Cookies—Robert French Macfarlane, Osterley, and Claude Dumbleton, Peterborough, England, to Baker Perkins, Ltd., Peterborough, England. No. 2,355,879. Aug. 15, 1944.

Frozen Confection Made by Filling Edible Hollow Tube Closed at One End With Liquid Filling and Subjecting to Refrigeration—Kenneth L. Hayden, Brooklyn, N. Y. No. 2,355,915. Aug. 15, 1944.

Sausages Linked by Mechanical Means—Richard Swoboda, Sr., Detroit, Mich. No. 2,356,099. Aug. 15, 1944.

Chocolate-like Mass Made by Grinding Cocoa, Sugar and Salt Together in Dry Form Followed by Mixing With Vegetable Oil To Give Desired Flavor, Texture, Color and Taste—Joseph G. Rubens, to Joe Lowe Corp., New York, N. Y. No. 2,356,181. Aug. 22, 1944.

Oil-in-water Type Emulsified Vitaminizing Fluid for Food Fortification Stabilized by Addition of Water-soluble Non-heat-coagulable Protein Obtained From Alcoholic Fermentation Residue—Fredus N. Peters, Evanston, and Eldor G. Rupp, Chicago, Ill., to Quaker Oats Co., Chicago, Ill. No. 2,356,350. Aug. 22, 1944.

Vacuum-packing Obtained by Replacing Air in Container Head Space With Water-soluble Gas Prior to Closing—Adolf Bargeboer, The Hague, Netherlands, to Alien Property Custodian. No. 2,356,498. Aug. 22, 1944.

Canadian Patents

Whey Dried on Heated Rolls to Give Granular Product of Light Color, and Lactose Content in Form of Beta Anhydride Crystals—Charles O. Lavett, to Buffalo Foundry & Machine Co., Buffalo, N. Y. No. 421,633. July 25, 1944.

Sugar Solutions Limed To Produce an Acid-soluble Precipitate of Calcium Phosphate—Robert Boyd, Vancouver, B. C. No. 422,170. Aug. 22, 1944.

Milk Casein Precipitated To Float on Surface of Whey by Incorporation of Noncondensable Gas in Milk To Produce Gaseous-liquid Dispersion Before Adding Precipitant—Edward L. Fritzberg, to General Mills, Inc., Minneapolis, Minn. No. 422,477. Sept. 5, 1944.

Leavening Composition Made To Contain Anhydrous Monocalcium Orthophosphate Crystals Containing Small Quantities of Iron Phosphate and Having Protective Crystalline Coating Consisting Principally of Aluminum Pyrophosphate—W. Walker Lewis, Jr., Dayton, Ohio, and Carroll A. Hochwalt, Rahn Road, Ohio, to Monsanto Chemical Co., St. Louis, Mo. No. 422,487. Sept. 5, 1944.

Sulphur Dip Prevents Browning of Apples

(*Continued from page* 81)

blue color. Add the iodine solution slowly and at the same time shake the flask with a gentle rotary motion. Reduce the rate to one drop at a time near the end, until the entire volume of bath solution becomes blue and retains the color. Care must be taken not to add more iodine solution than is required to give the first permanent blue color. A few preliminary trials may be necessary.

Now read the burette again. Subtracting the second burette reading from the first gives the number of milliliters of iodine used. Each milliliter of the 0.1 N iodine used represents 320 p.p.m. of SO_2 in the bath. For example, if the burette reading indicates that 8.9 ml. of iodine solution has been used, the strength of the bath is $320 \times 8.9 = 2{,}848$ p.p.m. of SO_2, which is within the desired range of 2,000 to 3,000 p.p.m. However, if only 5.4 ml. of iodine has been used, the concentration of SO_2 in the bath is $320 \times 5.4 = 1{,}728$ p.p.m. of SO_2. It is necessary then to add 1 lb. and 1 oz. of liquid sulphur dioxide, or 1 lb. and 13 oz. of sodium bisulphite, per 100 gal. of bath to bring the strength up to 3,000 p.p.m. of SO_2.

To avoid the necessity of calculating the strength of the bath and the amount of SO_2 or bisulphite to be added each time, the accompanying chart has been prepared.

When the bath becomes clouded by fruit particles, the vat should be emptied and rinsed, and a new solu-

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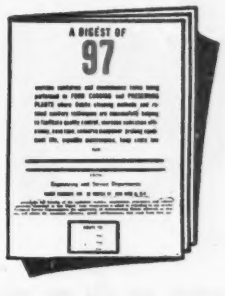

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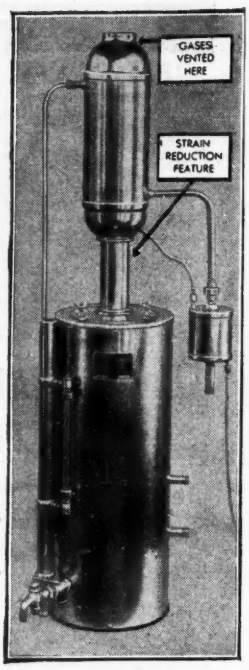

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Philadelphia Quartz Co., Dept. D, 125 S. Third St., Phila. 6.

tion be prepared. It is good practice to prepare a new solution daily.

Reference

[1]Information Sheet AIC-57, August, 1944, entitled Commercial Preparation and Freezing Preservation of Sliced Apples, prepared by the Western Regional Research Laboratory, Albany, Calif. This is one of the four regional research laboratories operated by the Bureau of Agricultural and Industrial Chemistry, Agricultural Research Administration, U. S. Department of Agriculture.

Inspiring Failures

(*Continued from page* 68)

cake perfume, so to speak—which could be put on the boxes in which the cakes were displayed? It was not a bad thought, though none of the perfumes developed by the Lab ever appealed sufficiently to Sales for a large-scale test to be made.

Directly along the line of appetizing cake smells, however, was the problem which arose when the company decided to open some retail outlets of its own for an extra-fancy line of breads and pastries. All baking was to be done in the plant, but it was desired to give each retail store the atmosphere of a small, individual, old-world bake-shop. Furniture and fixtures were chosen with this in mind. And as a further part of the stage setting, there had to be the tantalizing fragrance of fresh baking in the air.

As it turned out, a very satisfactory fragrance was achieved by cooking a mixture of sugar, butter and cinnamon on a hot plate in a screened-off part of the shop for 10 minutes every couple of hours. A small electric fan behind the hot plate served to shoot the smell into the front of the store and the effect was perfect.

Case of the Wilted Waffle

Probably the wackiest brain child ever foisted upon this food technologist, however, was what came to be known as the Episode of the Wilted Waffle, to the accompaniment of some very hollow laughter from the Lab staff.

It is no secret to anyone close to the development end of a food plant that some failures are undoubtedly caused by the insistence of a Front Office executive with a screwball idea and the authority to push it into the experimental stage over all protests. So it was with this waffle business. I blush even now to think of the weeks of utterly wasted time spent on that fruitless endeavor. It is peculiarly infuriating to spend technical skill on some piddling en-

terprise — time and effort poured down the drain just because the Mr. Big, who happens to be paying the salaries, decides he wants it that way. However, *c'est la guerre,* or something.

The idea was that the food market panted for waffles, packaged, ready-made and needing only the warming up that could be given right on the consumer's own breakfast table in the consumer's own Toast Master. It was, therefore, up to the laboratory to develop a waffle which could be packaged; which would have a shelf life of four days —equal to the life of the company's pies and hence adding no new distribution problems — and which could, by warming in a toaster, be converted into something approximating a fresh waffle.

After a great deal of work, a waffle meeting most of the specifications was ready for a sales test on one or two routes. Within a week, of course, the Front Office knew what everyone else had known all along—that the public wasn't waffle conscious.

Some things had been learned from the experiment, however, in regard to the importance of cooked starch pastes in products of this type. That knowledge was of value later on in the development of a baked cruller. It is my opinion, too, that had a mold inhibitor like Mycoban been available in those days, much of the difficulty with mold would have disappeared.

Nevertheless, the fundamental soundness of the whole idea is still open to question in my mind—or perhaps I'm unduly prejudiced, remembering those wasted hours bent over a waffle iron.

Alkali-Hydrolyzed Pectins As Industrial Products

(*Continued from page* 71)

Preparation

A general procedure for carrying out the de-esterifications with ammonium hydroxide on a semi-pilot-plant scale is illustrated with the following example. To 15 gal. of 4 percent pectin solution at 15 deg. C. in a glass-lined kettle was added concentrated ammonium hydroxide with stirring to give a pH of 10.5. The temperature was maintained by the addition of chipped ice over a period of 3 hours, at the end of which time 15 gal. of 95 percent ethanol containing suffi-

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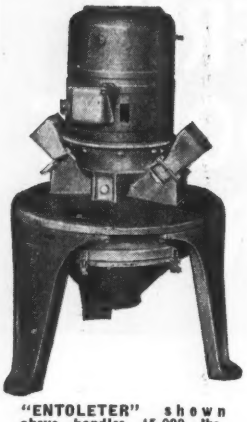

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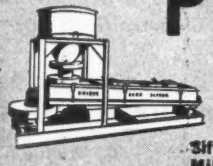

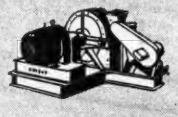

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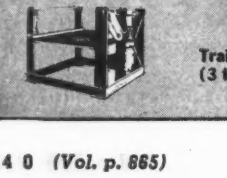
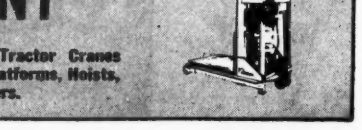


Materials

HANDLING EQUIPMENT



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cient hydrochloric acid to adjust the pH of the reaction mixture to 5 was added to precipitate the pectin. The precipitated product was stirred thoroughly and allowed to stand for an hour, followed by pressing in a hydraulic press. The press cake was disintegrated, suspended in 14 gal. of 50 percent alcohol, the pH adjusted to 5.2 (constant) and the mixture stirred for an additional 30 minutes. This treatment serves to remove a large portion of the ammonium chloride formed in the neutralization. The wet pectin was again separated by pressing, disintegrated and stirred for an hour in 10 gal. of 95 percent ethanol. The hardened pectin was pressed, dried *in vacuo* for 20 hours at 65 deg. C. and ground in a hammer mill to 100-150 mesh. The yield was 3.9 lb. (90 percent of theoretical based on moisture, ash and methoxyl content loss in the demethoxylation treatment). The aluminum hydroxide method of precipitation has also been used in the isolation of this product.

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New Facts About Packaging Dehydrated Foods

(Continued from page 92)

after three months instead of a decrease as would normally be expected. This apparent increase was probably due to the formation of other reducing materials which were measured as ascorbic acid by the method of chemical assay employed. The amount of other reducing materials formed evidently increases with the storage temperature. For this reason, the amounts of ascorbic acid reported at the one month's examination of flakes stored at 130 deg. F. are probably high. This same apparent increase has been observed in the course of our work with other dehydrated foods.

FOOD TECHNOLOGY
NEW DISCOVERIES AND INVENTIONS

DAIRY PRODUCTS

Mold Mycelia in Butter

Most of the mold filaments present in cream are retained in butter made from it. The proportion in the buttermilk was about a third or less of the total, in controlled churning experiments, with a negligible count in the wash water. Factors such as low fat content in the cream, which increase churning time and the amount of agitation, decrease the proportion of the mold mycelia in the butter. This is probably due to the fact that increased agitation or a longer period of agitation breaks up the longer filaments, so that they are more easily washed out.

Distribution of bacteria was also studied. Although in some cases these formed chains longer than the mold filaments, the bacterial cells tended to go into the buttermilk and many were removed by the wash water.

Digest from "Retention of Mold Fragments by Butter, Buttermilk and Wash Water During Manufacture of Butter," by P. R. Elliker, Journal of Dairy Science, vol. 27, 563-69, July, 1944.

STORAGE

Fluorescence Develops In Stored Foods

As an outgrowth of the work on dried egg quality, fluorescence measurements have been made on various foods after storage.

Since fluorescence development in dried eggs had been found associated with protein deterioration, other high-protein foods were investigated: dried whole milk powder, dehydrated pork and soya flour. To represent high-carbohydrate foods, dried banana flakes and dried parsnips were selected, with 12 shortenings to represent the fatty foods.

In the milk powder, fluorescence increased with age, but not in such a way that it could be correlated with lack of palatability in organoleptic tests.

For pork, a linear correlation was observed between fluorescence value and palatability. It is noteworthy that prolonged drying periods increased the fluorescence of the product to an initial reading almost double that of the quickly dried material. No relation was observed between peroxide values and fluorescence.

Fluorescence developed in soya flour, but at a rate independent of the storage temperature, while the palatability score indicated more rapid deterioration when the storage temperature was raised from 75 to 100 deg. F.

In the dried bananas and dried parsnips, fluorescence increased in intensity with temperature and time, paralleling the development of noticeable browning of the stored material.

In the shortenings, change in fluorescence value was less than the variability of the determination, except for hydrogenated linseed oil. Decreased fluorescence occurred at the same time that the development of reversion became noticeable.

The authors conclude that fluorescence measurements are not likely to be of value in testing dried milk powder, but may be useful in following the storage behavior of dehydrated pork, dried carbohydrate material and possibly mixtures such as ration biscuits. The test may also detect reversion in hydrogenated linseed oil.

Digest from "Fluorescence Development in Various Food Products," by J. A. Pearce, Canadian Journal of Research, vol. 22, 87-95, July, 1944.

Fresh Blueberries

Controlled-atmosphere storage tests on blueberries at the University of Maine are summarized in a recent bulletin.

For two- or three-week holding periods at 41 and 50 deg. F., CO_2 allowed to accumulate to between 10 and 15 percent in the atmosphere proved satisfactory. Berries kept better in quart boxes stored without cellophane than with it, and better when placed in storage without cleaning than when cleaned. High-bush berries tended to keep better than low-bush, but there is a difference in storage behavior for different varieties in each type. Fully ripe berries do not store as well as those harvested just before they attain full ripeness.

Closed-atmosphere storage in nitrogen resulted in mold formation, and there was some mold formed in berries stored in containers where the CO_2 content was kept below 8 percent.

Digest from "Composition and Uses of Blueberries, Storage of Blueberries," Bulletin 428, The Maine Agricultural Experiment Station, Orono, July, 1944, 30-31.

UNIT PROCESSES

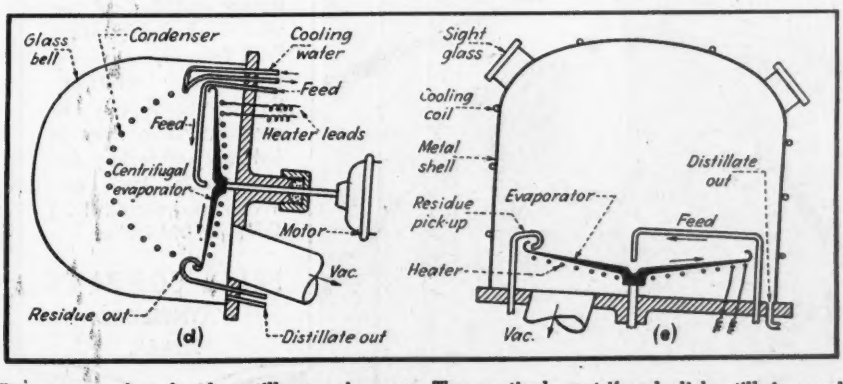
Ultra-vacuum Stills

Molecular distillation depends on the removal of practically all interfering molecules from above the liquid to be distilled, through use of vacua in the neighborhood of 0.001 mm. of mercury, and on very prompt removal of the liberated molecules on condensing surfaces arranged so that no matter what path a molecule may follow when it leaves the surface of the liquid, it will reach a condensing surface after a very short travel, a few inches at most.

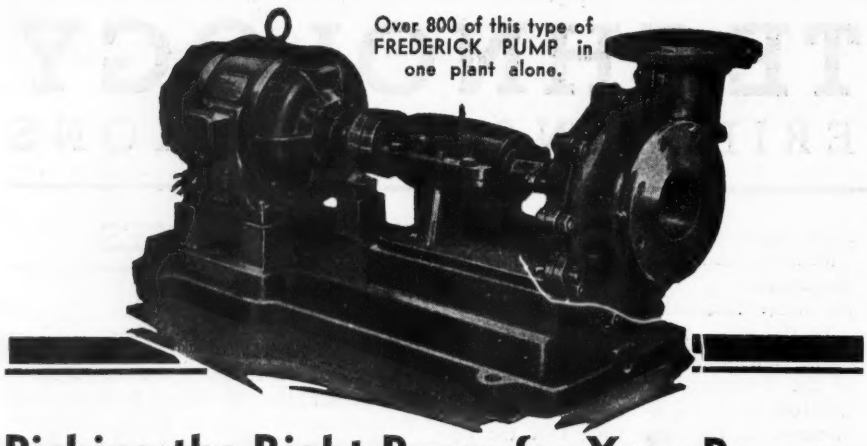
In the molecular still a mechanical system has been set up which carries to the extreme the principle well recognized in food processing, that in many cases materials can be subjected safely to otherwise harmful temperatures if the time of exposure is made sufficiently brief.

In the successful stills the feed liquid is held at a safe temperature and only a small amount is heated within the still at any one time. Heated liquid is moved in thin films for optimum heat transfer. And the condensate is removed from the heated zone promptly. At 0.01-mm. pressure, the exposure of the liquid to the full distillation temperature is of the order of 1 second or less, with the liquid film distributed on a heated centrifugal plate.

In spite of the minute differentials in its operating conditions, the molecular still is not a small-scale processing unit. Stills with 14-in. evaporating disks are being used at present for producing vitamin E in tonnage quantities, and 32-in. stills are used for recovering vitamin A from fish liver oils. New stills with a 4-ft. diameter truncated cone evaporating surface and throughput of 500 to 1,000 lb. per hour per unit have successfully undergone two-month test runs. These stills can take off six or more separate fractions. Costs of power, water, steam and other services are said to be



Two types of molecular still now in use. The vertical centrifugal disk still is used in the smaller sizes, the horizontal centrifugal disk type for the larger.



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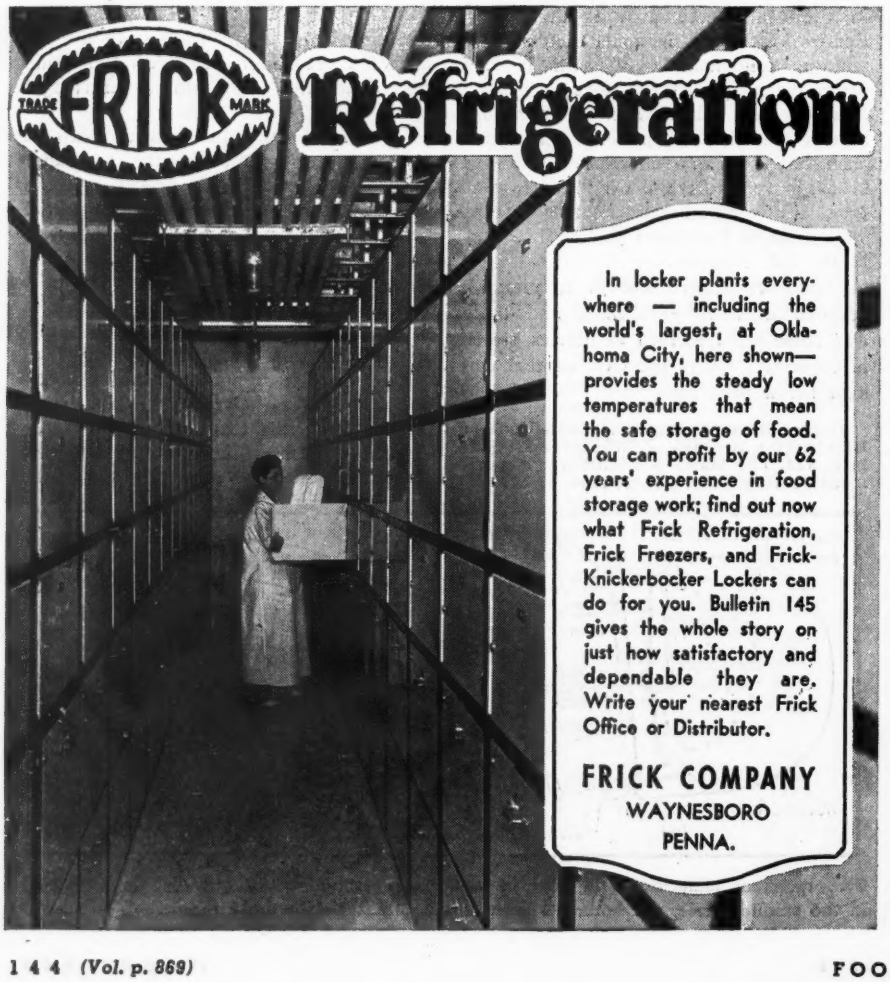
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well within the limits of commercial economy.

There are limiting factors in the application of the molecular still. The operating principle precludes close fractionation. It is relatively inefficient from a thermal standpoint. It does permit separation and purification of organic compounds of high molecular weight which undergo thermal destruction before distilling in the usual equipment. For many of these, however, other separation methods, such as solvent extraction and fractional crystallization, have been available.

Suggested applications of interest to the food technologist include the natural mixed glyceride fats of marine and vegetable oil origin. High-molecular-weight insecticides may be purified by this tool. More than 5,000,000 lb. of oils containing vitamins A and E, principally shark liver and pollock, was distilled in vacuum short-path stills last year in the United States.

Digest from "Molecular Distillation, A New Path to Separation of Chemicals," by T. R. Olive, Chemical & Metallurgical Engineering, vol. 51, 100-3, August, 1944.

QUALITY CONTROL

SO_2 Control Test

DEHYDRATED fruits and vegetables which do not yield appreciable amounts of hydrogen sulphide can be tested for sulphur dioxide content by a simple method which is claimed to give results closely comparable with the Monier-Williams method.

The SO_2 is distilled into distilled water, instead of into an iodine solution. The concentration in the receiving water will not be greater than 0.04 percent, and the solution is stable for the length of time required for titration. A two-phase titration is used, acetone with hydrochloric acid is added and the titration carried to the first end-point, then complexes that may have been formed are broken down by the addition of sodium bicarbonate and the titration is finished.

For vegetables, 10 g. of the sample mixed with 20 g. of common salt is added to 250 ml. of distilled water containing 30 ml. of 6N hydrochloric acid and a small piece of paraffin wax. Three grams of anhydrous sodium carbonate is added. Distillation is carried on until 30 to 40 ml. of distillate has been collected. For fruit, a 20-g. sample is used, with 400 ml. of distilled water in the flask, the distillation being regulated so that 45 minutes are required to distill 100 ml.

Digest from "Determination of Sulphur Dioxide in Dehydrated Vegetables and Fruits," by F. B. Johnston, Canadian Chemistry and Process Industries, vol. 28, 568-69, August, 1944.

Odors Measure Degree Of Protein Spoilage

VOLATILE reducing substances developed during aging and spoilage can be used to determine the degree of degradation of proteinaceous foods. The chemical test has been found more sensitive than organoleptic determination in borderline

cases. The test is particularly applicable to fresh and canned fish, but can be used on meat and other foodstuffs in which the development of odorous products characterizes spoilage.

A measured volume of washed air is passed through a sample of the water-soluble constituents of the fish or other food (obtained by pressing a ground sample), and then through 0.1 N potassium permanganate in N sodium hydroxide solution. The amount of reduction of the permanganate, determined volumetrically, is a measure of the odorous constituents developed.

The test is of wide applicability because it is independent of the presence of a large quantity of any one product of the spoilage reaction. The composition of the volatile fraction will vary with the organisms present and the original material, but the total of the reducing volatiles remains significant.

Digest of "Determination of Spoilage in Protein Foodstuffs, with Particular Reference to Fish," by O. W. Lang, L. Farber, C. Beck and F. Yerman, Industrial and Engineering Chemistry, Analytical Edition, vol. 16, 490-94, August, 1944.

BEVERAGES

Coffee-extract Flavor

NATURAL coffee oil, usually removed in processing because of its tendency to rancidity, is returned to pulverulent, soluble coffee extracts in order to improve the flavor and aroma of beverages made therefrom. Rancidity is prevented by the simultaneous addition of a small quantity of hydrogenated vegetable oil, preferably hydrogenated coffee oil, which itself contributes nothing to the flavor.

The invention may not only be used to improve the flavor of the natural coffee extract, but may be used to give a more desirable flavor to vegetable extracts which are used as coffee substitutes.

The claims cover a coffee powder containing 0.125 to 2.0 percent of added natural coffee oil, with the hydrogenated vegetable oil in the proportion of one-sixteenth to one-fourth of the added natural oil.

Digest from U. S. Patent No. 2,350,903, issued June 6, 1944, to J. L. Kellogg, and assigned to John L. Kellogg & Co., Chicago.

CANNING

Toxin Development In Inoculated Cans

BEETS and carrots in internally lacquered and unlacquered cans were inoculated with several strains of *Clostridium botulinum*. Toxin production occurred in the lacquered cans when incubated. Inhibition of growth was associated with the presence of dissolved tin.

For carrots, in cans held at 37 deg. C., 44 to 72 p.p.m. of tin prevented growth and toxin formation for three weeks, and for beets 126 to 384 p.p.m. of dissolved tin is reported for unspoiled cans held

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at 37 deg. C. for periods ranging from 5 to 65 days.

Addition of tin salt solutions prevented growth of the toxin-producing organisms in inoculated, normally processed, beets and carrots. Tin concentrations of 150 p.p.m. or more were required for beets with initial pH values of 5.31 to 5.50, while 60 p.p.m. protected carrots at an initial pH of 5.14 to 5.23, incubated at 30 and 37 deg. C.

Digest from "The Influence of Dissolved Tin on the Growth of Clostridium botulinum in Canned Vegetables," by W. J. Scott and D. F. Stewart, Journal of the Council for Scientific and Industrial Research, vol. 17, 16-22, February, 1944.

Processing of Juices

GERMAN METHODS of preparing cherry and orange juices are reported by *Chemical Abstracts.*

Cherries are sorted, washed, comminuted, pressed for 30 minutes then loosened and repressed, with a total yield of 65 to 68 percent. After 1 or 2 days for clarifying, 7 percent sugar is added. The juice is heated to 158 deg. F., then bottled and pasteurized at 176 deg. F. A good cherry juice is said to have contained 26.7 percent total solids, with a pH of 3.8, 1.36 percent acidity and an Ostwald viscosity of 1.72.

Juice from Spanish oranges and Russian mandarins is filtered after extraction, and has sugar added. The juice is bottled at about 160 deg. F. and pasteurized 30 minutes. A considerable loss of vitamin C is reported, from 55 to 60 mg. percent down to 19 for the Spanish oranges and from 48 to 53 down to 16 mg. percent for the Russian mandarins.

Digest from "Production of Cherry Juice," by I. A. Sakovich and B. L. Flamenbaum, Konserven—Obst- und Gemuese-Verwertungsindustrie, vol. 11, No. 5/6, 15-22, 1940, and S. K. Kaliskii and I. M. Washerman, same journal, 14-15; through Chemical Abstracts, vol. 38, 2135, 1944.

FATS AND OILS

Edible Linseed Oils

UNPLEASANT FLAVORS and odors developed in hydrogenated linseed oil on heating are at a maximum in the range of iodine numbers between 75 and 100. Carrying the hydrogenation beyond the customary point, to an iodine value of about 40, prevents development of the undesirable odor. However, the product is then so hard that it can be used as a shortening only when blended with a liquid oil.

Hydrogenation of blends of about 25 percent linseed oil with cottonseed or sunflower seed oil seems to be fairly satisfactory.

This report is the outcome of work done in an effort to establish a domestic source of shortening oils in Canada, where the production of vegetable oils, except linseed, is small.

Digest from "Edible Products from Linseed Oil," by H. W. Lemon, presented before the 27th Annual Canadian Chemical Conference, June, 1944.

Questions & Answers

Candy Storage

Oregon—"We are looking for information as to the proper storage temperature of candy, both chocolate and other, which includes hard candy, marshmallows, caramels and fondant. Can you give us information which will enable us to build and arrange for proper storage of such candy?"

How to make reply without misleading you is a puzzle. That is particularly true with respect to proper storage temperatures for hard candy, caramels and marshmallows in which the corn sirup content varies so widely.

In the case of straight chocolate bars, stars, buds, wafers, and the like, temperature is the principal condition to take into account. The best temperatures are from 60 to 65 deg. F. Temperatures of 67 to 69 deg. particularly should be avoided because that seems to be the critical range for the crystallization of the cocoa butter of the chocolate, and a grainy, powdery mass results if chocolates are stored at that temperature. In other words, it is better to store at 71 to 75 deg. F. than it is to store at 67 to 69 deg. F., if temperatures of 60 to 65 deg. F. are impossible to maintain. Moisture content of the air is not important so long as the humidity does not reach the dew point for the temperatures used. It is best to stay on the safe side, however, and maintain a relative humidity of approximately 75 percent.

If the chocolate is combined with nutmeats, particularly nonroasted nutmeats, the storage temperature should be in the range of 40 to 45 deg. F. That holds also for chocolate-coated cherries. When such low temperatures are used, the nut-topped chocolates or chocolate-coated centers should be brought out of cold storage by gradual steps of increased temperatures to avoid condensation of moisture, which gives rise to loss of gloss and to sugar bloom, as well as to potential mold growth.

In the case of marshmallows, the temperature range is not as important as is relative humidity. During prewar days when sugar was plentiful and a minimum of corn sirup or similar hydrolyzed starch sweeteners was used, a relative humidity of 72 to 73 percent was specified. Above 73 percent, the marshmallow was likely to pick up moisture and deteriorate in quality. Below 72 percent, it was likely to lose moisture and become hard. During the present period of sugar restriction and increased use of hydrolyzed starch sweeteners, a relative humidity of 60 to 65 percent has been found practicable. Obviously, the optimum relative humidity depends upon the composition of the marshmallow and its susceptibility to either picking up or losing moisture. This should be determined experimentally for the particular combination of ingredients selected.

Conditions for storing marshmallows hold to some extent for the storage of hard candy. The exact conditions to be maintained depend upon the hydrolyzed starch sweetener content of the candy, and humidity is far more important than is temperature. As far as hard candy is concerned, temperatures can be up as high as 85 deg. F., but the relative humidity must be as low as 35 to 40 percent when the sweetener content of the formula runs as high as 80 percent corn sirup or some other type of hydrolyzed starch sweetener.

Caramels require approximately the same relative humidity levels as hard candy but should not be stored at temperatures appreciably higher than 70 deg. F.

Conditions of storage for fondant or bonbons are not so critical, as long as the relative humidity is safely below the dew point for the temperatures used.

From all these comments, you can rightfully conclude that providing for proper storage of various types of candy requires considerable thought and should involve the services of a qualified refrigerating engineer. The larger companies employ trained and experienced engineers and in addition avail themselves of the services of top-ranking refrigeration and air conditioning consultants when making additions to their production areas or storage facilities.

Drying Flavored Salt

Oregon—"Will you please advise what should be used as a small experimental equipment with which to dry and crystallize a salt-seasoning?"

For the experimental drying, it is our opinion that it will be satisfactory to dry in a shallow dish in a temperature-controlled oven. This will not give uniform particle size, but you will have to grind in any case to get a uniformly fine product.

If you want more elaborate equipment, giving controlled crystallization, consult the chemical engineering faculty of your own state university, as they will be able to suggest suitable laboratory-scale equipment.

Gas Packing

Michigan—"We are wondering, if you could give us information, or refer us to a source of information on controlling rancidity of an oily product by packing with gas such as carbon dioxide, nitrogen or any other."

The patents on the process and on the machinery for gas packing are controlled by the American Can Co. If you will address a letter to this organization at 230 Park Ave., New York, N. Y., you will receive full information.

FORMULAS FOR FOODS

FORMULA NO. 492

Orange Butter Pie With Soya Flour

Egg yolks	1 lb.
Enzyme-converted corn sirup	4 lb. 8 oz.
Granulated sugar	1 lb. 12 oz.
Butter	4 oz.
Salt (variable)	½ oz.
Full-fat soya flour	12 oz.
Bakers' starch	2 oz.
Orange juice	1 lb. 8 oz.
Orange gratings	4 oz.
Water	2 lb.
Egg whites	1 lb. 8 oz.

Directions

Beat together thoroughly the egg yolks, corn sirup, sugar, softened butter, salt, soya flour and bakers' starch. Add the orange juice and gratings, stirring in well. Add the water, warm, and stir in well to produce a foam. Beat the egg whites stiff, then fold into the mixture.

Fill into unbaked pastry-lined tins that have been allowed to dry. Fill completely full. Bake at about 385 deg. F. with little top heat.

Formula from A. E. Staley Mfg. Co.

FORMULA NO. 493

Fruit Bars

Granulated sugar	20 lb.
Shortening	10 lb.
Milk powder	1 lb. 4 oz.
Soda	5 oz.
Salt	5 oz.
Eggs	5 lb.
Molasses	6 lb. 14 oz.
Water	5 lb.
Seedless raisins	12 lb.
Oatmeal	1 lb. 8 oz.
Cake flour	32 lb. 8 oz.
Cinnamon	7 oz.
Ginger	3 oz.
Allspice	5 oz.

Directions

Mix together the sugar, shortening, milk powder, soda and salt. Add the molasses and water, stirring into the mix. Add the oatmeal and the seedless raisins, then the flour and spices, folding the latter in.

These can be run on a cookie machine, using a special four-hole die.

Scale 13½ oz. to a strip of 18. Bake at 380 deg. F.

To run on the cookie machine, remove the cutter arm and use a special die which is made of a piece of flat steel the same size as the regular die, with four small holes spaced so that they will drop the material into the pans. These pans are 3x30 in., with a 1-in. sidewall. It takes about nine strokes to run out a full-length bar, as the pans pass under the die. When the full-length bar has been obtained, a short stop must be made to cut it off before continuing with the next pan.

Bars are slightly flattened in the pan before baking. After baking they are dumped on a conveyor belt while warm and stacked four high, to be cut with a knife by hand. They are then ready for wrapping.

Formula from P. C. T. Ewert, Excelsior Baking Co., through American Society of Bakery Engineers.

FORMULA NO. 494

Nougat Santo Domingo

Egg albumen	10 oz.
Tapioca flour	10 oz.
Water	1 lb. 8 oz.
Molasses	10 lb.
Granulated sugar	30 lb.
Standardized invert sirup	5 lb.
Corn sirup	10 lb.
Coconut butter (86 to 88 deg. F. melting point)	3 lb.
Powdered whole milk	4 lb.
Powdered salt	2 oz.
Shredded citron	5 lb.

Directions

Dissolve the albumen in the water, add the tapioca flour and 5 lb. of molasses. Beat until quite light. Transfer the whipped batch to an upright beating machine.

Boil 5 lb. of sugar, the corn sirup, enzyme-converted corn sirup and molasses with enough water to dissolve the sugar. Bring to 250 deg. F. Add 1 gal. of this sirup to the beaten portion and beat for several minutes. Gradually add the balance of the batch and beat until quite light and grain is visible. Add the citron, coconut butter, powdered milk and salt, mixing well.

Spread the batch on oiled and dusted slabs. It may be cut into bars or formed into kisses or other shapes by passing the batch through a rolled cream center machine.

Formula from The Nulomoline Co.

FORMULA NO. 495

Thuringer Sausage

Trimmed beef chucks	35 lb.
Pork shoulder trimmings	35 lb.
Lean pork trimmings	10 lb.
Smoked lean pork trimmings	20 lb.
Salt	3 lb.
Sugar (half dextrose)	14 oz.
White pepper	6 oz.
Mapleine	2 oz.
Sodium nitrate	3 oz.

Directions

Grind the beef through a 1/8-in. plate and the pork through a 1/8-in. plate. Mix with the seasoning and curing ingredients and place in the cooler to cure at 38 deg. F. Remix meat after curing and stuff in 30-in. export hog bungs. Hold in the cooler for 48 to 72 hours after stuffing, then warm up for 4 or 5 hours to room temperature before beginning smoking.

Smoke for 48 hours at 90 to 100 deg. F., and then raise temperature gradually during the next 24 hours to 150 or 155 deg. F., or until the internal temperature of the product is brought up to 140 deg. F.

The sausage may also be smoked for a shorter time (12 hours) at 90 to 100 deg. and finished by cooking in water at 155 deg. for 2 hours. The product should be thoroughly cooled before it is placed in the storage cooler.

Formula from Crescent Manufacturing Co.

FORMULA NO. 496

Butterscotch Topping

Granulated sugar	15 lb.
Clear sirup	28 lb. 8 oz.
Water	44 lb.
Butter	8 lb.
Egg yolks	12 lb.
Cornstarch	6 lb.
Salt	1½ oz.
Vanilla	1 lb.

Directions

Boil to 280 deg. F. the granulated sugar and corn sirup with 2 lb. of water. Add the butter to this. Blend together the egg yolks, cornstarch and 6 lb. of water. Bring to a boil 36 lb. of water containing the salt, and add the sugar and cornstarch mixtures. Cook until clear. Blend in the vanilla.

Formula from William Gordon, Awrey Bakeries, through American Society of Bakery Engineers.

FORMULA NO. 497

Raisin Spice Cake

Sugar	2 lb. 8 oz.
Shortening	4 lb.
Salt	2 oz.
Cinnamon	3 oz.
Allspice	1 oz.
Cloves	½ oz.
Mace	½ oz.
Eggs	3 lb.
Molasses	2 qt.
Water	2 lb.
Soda	1 oz.
Flour	8 lb.
Baking powder	1 oz.
Raisins, seeded and puffed	8 lb.

Directions

Cream the sugar, shortening, spices and salt. Add eggs in 4 parts, then the molasses. Add the soda dissolved in water. Sift flour with baking powder and add. Put in raisins last and mix lightly.

Bake in square or round pans at 275 deg. F.

These cakes may be iced if desired, but it is not necessary.

Formula from Sun-Maid Raisin Growers Association.

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